



COLONY AND PROTECTORATE OF KENYA

DEPARTMENT OF AGRICULTURE
ANNUAL REPORT
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DEPARTMENT OF AGRICULTURE ANNUAL REPORT, 1952

PART I—AGRICULTURE IN 1952

Policy

In the 1951 Report I referred to the year in retrospect as one showing heartening evidence of progress. Facts and figures which follow are evidence of continued progress but, with the declaration of a State of Emergency in October, a serious disruption of the development programme was inevitable particularly in the Central Province. Many officers were diverted to emergency duties and, although everything possible was done to lessen the ill-effects, both extension and investigational work suffered. A number of our best African Instructors were murdered and a number also joined forces with *Mau Mau* and possibly this loss of our trained staff constitutes the most serious setback.

For some considerable time senior officers have been engaged in drawing up a more definite and detailed agricultural policy for the African lands than has hitherto been available. It was felt that high sounding phrases like "the maintenance and enhancement of soil fertility" and "the provision of an adequate food supply for the people" were of little practical value to the many young and inexperienced officers in the field if they were to develop all the economic facets of planned farming necessary to achieve maximum but sound productivity. Conditions vary greatly in Kenya even over short distances and something more than broad general principles is needed for the inexperienced. Furthermore, the necessary mass attack on soil conservation over the past years has now achieved its purpose in that, generally speaking, the soil by means of terraces, grass strips, cut-off drains, etc., is being held in position. Maintenance must continue but we can now enter the essential second phase of ensuring the adoption of improved methods of land use.

The policy, as drawn up for the various Provinces, is uniformly based on distinct ecological zones which are decided by the natural complex of climate, vegetation and topography. For each zone an attempt has been made to define correct land use. The need to apply correct land use to each ecological zone cannot be over-stressed whether dealing with apparent over-population or with its spill into less genial climes. Any administrative short cut to push people and stock into an area in excess of its potential and correct use ahead of agricultural investigation will in the end create an infinitely worse problem than maintaining the *status quo* for a few years and then developing a sound pattern of settlement. It may not absorb as dense a population as might be wishfully thought but, if the necessary technical safeguards are applied pending research into more intensive systems of farming, it will at least be durable. In arriving at the farming unit, the target acreages and production potentials, it was necessary to assume the non-existence of many practical limiting factors, e.g. the present inexorable pattern of land tenure, the provision of economic livestock of the correct breed and in sufficient numbers, market prospects, the will to work and many others, but at least we have a clear picture of what, in our present state of knowledge, is agriculturally possible and agriculturally desirable and we have something to aim at. The starting point in assessing potentials was the minimum unit of land necessary for the average family to grow its food requirements and obtain a cash income from surplus crop and stock products and from appropriate cash crops which will enable the standard of living to be raised well above the present level. Detailed systems of farming and the

economics of each are available for all zones of each Province and these will be of great value in farm planning, a development which will shortly be the most important activity of the extension services of the Department and which will require a much higher standard of education and training amongst the African staff, with commensurate improvement in conditions of service.

There are indications that the constant pressure from this Department over the years for a more determined and serious effort to resolve the land tenure problem is beginning to have some effect. We favour in all the possible mixed farming areas of Kenya the enclosure of land and the granting of individual rights of occupancy to the land with certain safeguards as to its use and inheritance. It is an historical fact that sound land use and capital development of the land only take place after enclosure of the land and individual ownership are established. There is no doubt that one of the major causes of apparent over-crowding in the African lands is bad land use and fragmentation of holdings; under present tenure systems the land cannot be farmed either intensively or efficiently.

In this year of Commissions and disturbances, a subject which has received publicity is Government's policy in regard to the growing of cash crops by Africans. The first duty of this Department is to ensure the food supplies of the people. At this stage of development and with an expanding population the maize surpluses of North Nyanza and the European Highlands cannot be relied upon indefinitely to feed hungry rural populations as well as rising urban populations, and to provide the carry overs against the lean years. The farming system in each zone should aim at being not only self-sufficient in food but surplus providing on balance. Before a cash crop (non-edible) is introduced the African must be taught to conserve his natural resources and adopt a system of farming that will ensure his food supplies. When this stage is reached cash crops are introduced but the African must be taught appropriate cultural methods for the cash crops. This requires trained staff. Our annual target for new coffee planting for example is 2,000 acres, which means that some 8,000 new individual plots added each year have to be supervised by our field staff in addition to their many other duties. That is one difficulty. Another is the fact, established by sad experience throughout Africa, that nothing sets agricultural progress back more (through loss of confidence) than advice to plant a cash crop which is unsuited to the locality or which suffers a sudden drop in demand or price. The function of high priced cash crops is to provide the finance and encouragement for capital development of the farm, fencing, buildings, water supplies, spraying equipment for tick control, seeds (particularly grass), improved stock, manures, etc., while occupying the minimum amount of land. Cash crops are essential if the standard of farming and of living are to be raised and cash crops, grown not as scattered plots but as an integral part of a farming system under suitable conditions and efficiently managed, receive, and will continue to receive, all possible encouragement and assistance.

Let it not be thought that, because farming systems have been drawn up for the various ecological zones, we know all the answers. The general picture is still one of inefficient land use, a rapidly increasing population and a steady decline in soil fertility. The systems and recommendations we are in a position to make will, if put into practice, assist in maintaining fertility and in increasing production per unit of land. We are, however, very far from possessing that degree of technical knowledge which would enable us to tell the African how to make the most efficient use of his land; the principles of good husbandry for tropical conditions are very imperfectly known; we have no considerable experience to draw on and the agricultural practices of temperate climates cannot, in general, be successfully applied. Hence there is a very urgent need for comprehensive research to work out farming systems and methods suited to the very diverse soil and climatic conditions found in Kenya which will maintain soil fertility and increase production.

The field of research to be covered may be summarized very briefly as—

- (i) The evolution of farming systems and methods of maintaining soil fertility;
- (ii) Methods of increasing crop yields;
- (iii) The prevention of loss in field crops and in stored products;
- (iv) The introduction and cultivation of cash crops.

The report which follows describes what we have been able to achieve in this direction; it records a distinct improvement in the recruitment of specialist officers but qualified agricultural officers for agronomic investigations and advisory work are still in very short supply. Despite the improvement in the staff position and in facilities for research for the past year or two and having regard to the diversity of climatic conditions in Kenya and the consequent considerable variety of problems which need to be tackled, the staff authorized is still far too small for progress to be made at the speed which is so necessary for the early solution of the major problems of African land utilization.

In the European areas it is gratifying to have the Department's policy and views endorsed by Mr. Troup, the Commissioner appointed to inquire into the general state of farming in the Highlands. In all the possible mixed farming areas he advocates the adoption of balanced alternate husbandry; our policy of farm planning should, he says, "be encouraged at all costs" and he adds that this involves "a sufficiency of competent and experienced technical staff". He advises a further intensification of our work on soil conservation, on the provision of water supplies and on field drainage. Amongst the major problems of first priority he mentions pasture research and plant breeding and although the importance of these two lines of research has been fully recognized by the Department, and although facilities have been improved in recent years, the Department is still pressing and will continue to press for greater resources. He advises subdivision of the larger farms and the introduction of the landlord and tenant system, both of which he considers not only desirable but essential if the estimated potentials are to be achieved. In this development he emphasises the need for advisory work. The key man in this advisory service is "the Agricultural Officer of the area" and "the first need is for more staff and, in particular, for more experienced staff". He criticizes the present system of salary scales and promotion prospects as being most unlikely to produce the men within his ten year development period. The right type of officer exists, and in my view could be obtained but he cannot be obtained on the cheap. On the subject of under-capitalization of agriculture his proposals for taxation relief are welcomed in principle. This Department's Annual Report for 1949 records—

"It is essential that in a developing Colony such as this, ways and means be found to relieve the agriculturalist of direct taxation to the greatest possible degree and to ensure that such relief that may be given is put back into the development of the land . . . financial assistance by way of loans, whilst essential in some cases, must be considered a palliative and not a cure; some sounder and more concrete method must be devised of giving relief if optimum productivity is to be obtained". Mr. Troup has made specific recommendations.

Weather

After the good short rains which continued until the end of 1951, very dry conditions prevailed in the Coast and Central Provinces in the early months of 1952. The long rains were late in starting and, although heavy from mid-April until mid-May, were of short duration and not conducive to good annual crop yields. The remainder of the year was extremely dry and the short rains a failure. By contrast, rainfall conditions West of Rift were abnormally wet in the early months. Although in Rift Valley Province this encouraged rats, weeds and grain-eating birds,

there came a break in June from which there was no real recovery, setting back crops and encouraging the Aphis pest on wheat in Nakuru district. In Nyanza the long rains began early at the end of February and heavy rain continued until the end of May, causing water-logging, hindering the weeding of food crops and reducing yields. Although a dry June postponed the planting of cotton until July, growing conditions were then good until September whereafter dry conditions prevailed until the end of the year.

(The Director of Agriculture is indebted to the Director of the East African Meteorological Department for the following detailed notes on weather conditions and for Table A on rainfall over the main agricultural areas of Kenya during 1952.)

Rift.—Rainfall in the Rift area was 19 per cent below average for the year. April and May exceeded the average by about 30 per cent but all the other months were well below normal.

West Rift.—Rainfall was above average in April, May and September, about normal in July and October, but well below average for the rest of the year. The resulting total for the year was only 4 per cent below average.

East Rift.—In the East Rift area rainfall was well below average for all months except May, the deficit for the year being 33 per cent.

Trans Nzoia.—Rainfall distribution during the year was very similar to that in the West Rift with falls in excess of average in March, April, May and October. The total for the year was 3 per cent below normal.

Nyanza.—This was the only area in Kenya with an annual total above average, the excess being, however, only 7 per cent. Falls were above average or near average in most months; the only months with very low totals were January and December which were 74 per cent and 94 per cent below normal respectively.

Main Coffee Areas.—Rainfall was above average only in April, May and September, and about normal in August. The rest of the year was very dry, the percentage departure for the year being 17.

Coast.—The Coast area was the driest in the Colony with an annual deficit of 39 per cent. November was the only month with falls above average when the excess was only 19 per cent.

Food Production in African Areas

In the Provinces "East of Rift", the people benefited from the aftermath of the very good rains in 1951, including the good and prolonged short rains to which must be attributed the comparatively good sales of surplus produce in Central Province despite the dry year and the reasonably good reserves of food carried forward by the people up to the end of the year so that it was unnecessary to import food in any quantity. In the Coast Province, exports of scheduled crops were stopped from the Malindi and Kilifi districts, and maize or maize meal to the extent of 33,218 bags were imported for sale through traders mostly for Kilifi, Malindi and Lamu. The people of Taveta were able to fill their deficit by purchases at markets from the Wachagga in Tanganyika. Efforts to step up cassava growing in the Coast Province as a famine reserve were hindered by drought.

In Rift Valley Province, while African districts were self-sufficient for food, squatters, particularly forest squatters, in the Kinangop, Elburgon, Turi and Londiani areas grew and sold very substantial quantities of potatoes, the surplus totalling some 130,000 bags, a production which, being largely in the hands of Kikuyu, might be seriously jeopardized by the Emergency. There was also a substantial production of squatter maize.

TABLE A—RAINFALL OVER THE MAIN AGRICULTURAL AREAS OF KENYA—1952

DISTRICTS	RIFT		WEST RIFT		EAST RIFT		TRANS NZOIA		NYANZA		MAIN COFFEE AREAS		COAST	
Number of Stations	19		11		18		21		22		25		16	
	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall	Mean Fall 1952	Aver- age Fall
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
January ..	0.11	0.90	0.05	1.36	0.16	1.03	0.02	0.76	0.48	1.87	0.29	1.41	0.29	0.76
February ..	1.07	1.34	1.94	2.09	0.82	1.10	1.26	1.35	4.32	3.05	0.73	1.62	0.21	0.50
March ..	0.47	3.04	1.61	3.88	0.68	2.60	3.34	2.77	5.44	5.45	1.23	4.61	1.58	2.01
April ..	7.23	5.82	12.09	6.98	3.62	5.54	7.60	5.83	12.07	9.02	11.60	9.43	2.21	6.45
May ..	6.99	5.03	8.80	6.08	5.26	3.96	6.92	6.16	12.71	9.36	7.54	5.39	6.72	13.07
June ..	1.34	3.61	2.26	5.18	0.52	2.38	2.95	4.75	4.74	5.76	0.12	1.73	4.70	4.90
July ..	3.03	4.74	5.90	5.87	2.13	3.77	5.47	6.26	7.98	4.91	0.62	0.68	1.17	3.22
August ..	4.25	4.87	5.46	6.59	3.17	3.65	6.24	6.43	5.92	6.21	0.93	0.91	0.76	2.52
September ..	2.49	2.87	5.25	3.99	0.83	1.73	3.73	3.98	5.58	5.79	1.49	1.05	2.05	2.41
October ..	2.05	2.33	2.50	2.46	1.33	2.26	3.37	2.94	4.85	4.25	1.85	2.80	1.76	3.05
November ..	2.08	2.77	1.36	2.74	2.66	3.18	1.40	2.32	3.89	4.60	5.11	5.75	3.23	2.71
December ..	0.66	1.81	0.24	2.20	2.28	2.09	0.95	1.21	0.23	3.73	0.91	3.60	1.65	2.61
Year ..	31.77	39.13	47.46	49.42	22.46	33.29	43.25	44.76	68.21	64.00	32.42	38.98	26.33	44.21

In Nyanza difficult planting conditions followed by drought in the last months of the year reduced the expected surplus of maize for the 1952 crop to 55,000 tons compared with 65,724 tons from the 1951 planting. Local food shortages, particularly among the Luo on the Kano Plains, resulted in substantial internal movement of maize, particularly from the Kericho African areas.

Agricultural Exports in 1952

The value of agricultural exports showed a further increase to £22,752,477 over the 1951 record figure of £20,711,347 and this despite a drop of £2,478,592 in the value of sisal due to the very marked drop in price. This was more than countered by the increase in the coffee crop due to a good crop and firm prices. Decreases in the exports of cattle hides, wheat and goat and kid skins were offset by increased exports of tea, wattle extract, cotton, maize, wheat flour and pyrethrum.

Exports of the following nine commodities exceeded £500,000 in value, wheat and goat and kid skins falling out and pyrethrum coming into the table:—

	<i>Position 1951</i>	<i>1951 £</i>	<i>1952 £</i>
1. Coffee	(2)	4,096,317	7,123,360
2. Sisal	(1)	6,948,160	4,469,588
3. Maize	(7)	666,850	2,385,264
4. Wattle Extract	(4)	1,263,848	1,685,912
5. Tea	(3)	1,397,278	1,315,803
6. Cotton	(6)	986,478	1,098,271
7. Wheat Flour ..	(10)	515,377	647,735
8. Cattle Hides ..	(5)	1,165,662	593,224
9. Pyrethrum ..	(—)	357,123	511,971

The following table shows certain other agricultural produce of value:—

	<i>1951 £</i>	<i>1952 £</i>
10. Goat and Kid Skins ..	609,578	413,977
11. Castor Seed	124,915	392,463
12. Butter, including Ghee ..	242,318	391,123
13. Wheat	639,017	281,949
14. Meat of Swine	253,660	257,556
15. Beans and Peas	70,935	254,627
16. Sunflower Seed	147,797	183,319

Table "B" gives fuller details of domestic exports from Kenya in 1952, while Table "C" gives comparative quantities and values of exports of Kenya produce for the years 1939 and 1949-52 inclusive.

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCE, 1952

COMMODITIES	UNIT	QUANTITIES					VALUE				
		1939	1949	1950	1951	1952	1939	1949	1950	1951	1952
ANIMALS LIVING—	No.	—	—	10	14	—	—	—	110	—	—
Cattle	"	—	—	—	770	—	—	630	—	132	—
Sheep and Goats	"	—	592	—	—	210	—	—	1,034	—	315
ANIMAL PRODUCTS—	Cwt.	1,376	2,345	16,323	25,545	24,556	9,080	24,507	157,418	253,660	257,556
Bacon and Ham	"	1,208	1,172	739	399	695	5,162	16,503	13,235	10,144	12,767
Beeswax	"	21,277	10,162	11,040	12,698	23,533	90,659	131,289	156,403	202,318	391,123
Butter, including Ghee	"	652	107	162	222	238	2,987	1,053	1,712	3,045	3,419
Cheese	"	19,245	44,143	63,226	43,890	42,782	53,372	373,486	791,388	957,637	563,613
Hides (shade-dried)	"	337,082	*26,035	*33,205	*26,629	*19,982	18,152	608,613	903,008	773,347	389,099
Skins (Sheep and Goats)	"	21,737	9,885	10,744	10,653	2,450	43,444	62,990	111,745	208,025	29,611
Hides (sun-dried)	Cwt.	1,014,543	*6,345	*5,002	*2,442	*1,863	40,900	99,592	88,320	51,757	24,878
Skins (Sheep and Goats)	"	—	—	—	10,787	6,563	—	—	—	165,171	57,575
Other Hides and Skins	"	—	—	—	—	—	—	—	—	—	—
Wool	Centals of 100 lb.	15,114	10,267	11,865	14,688	12,024	56,578	94,619	208,661	379,240	240,689
CROP PRODUCE—	Ton	215	25	8	1 $\frac{1}{2}$	260	1,561	238	54	23	5,169
Coconuts and Copra	Cwt.	338,125	156,300	204,804	198,759	338,441	800,827	1,509,836	3,549,406	4,096,317	7,123,360
Coffee	Centals of 100 lb.	59,677	22,246	18,879	38,855	60,505	124,021	248,374	227,823	986,478	1,098,271
Cotton	Ton	29,163	33,413	35,875	38,825	33,273	442,434	2,851,823	4,061,168	6,948,160	4,469,588
Sisal	"	16	103	120	39	42	810	15,408	15,736	9,350	8,240
Flax	"	123,002	9,607	49,902	39,609	151,035	40,250	17,136	89,500	70,935	254,627
Beans and Peas	Cwt.	1,007,125	63,150	617,085	406,471	1,365,478	222,037	46,467	720,235	666,850	2,385,264
Maize	"	112,029	47,146	83,325	16,162	28,553	25,450	37,182	67,125	15,895	36,801
Maize Meal and Flour	"	7,756	26,364	31,751	16,234	30,611	2,702	40,390	49,244	35,054	64,035
Pulses other than Beans	"	973	141,772	30,415	427,232	147,869	393	185,374	43,184	639,017	281,949
Wheat	"	63,883	137,625	125,893	254,746	269,037	50,655	226,511	223,016	515,377	647,735
Wheat Flour	"	—	—	—	—	—	—	—	—	—	—
Grain, other than Maize	"	14,618	32,171	4,169	763	6,811	4,424	22,645	3,116	878	7,223
Wheat	"	402	—	—	—	6	4,442	4	17	—	403
Groundnuts	Ton	—	—	—	—	—	—	—	—	—	—
Cashew Nuts	"	32	46	140	73	40	1,812	10,396	22,381	22,349	14,005
Castor Seed	"	—	—	—	—	5,440	(a)	(a)	(a)	(a)	392,463
Sunflower Seed	Ton	477	1,865	2,655	3,225	4,446	3,997	60,601	89,634	147,797	183,319

TABLE C.—QUANTITIES AND VALUES OF KENYA PRODUCE, 1952

COMMODITIES	UNIT	QUANTITIES					VALUE				
		1939	1949	1950	1951	1952	1939	1949	1950	1951	1952
CROP PRODUCE—(Contd.)							£	£	£	£	£
Coconut Oil ..	Imp. Gal.	33,152	*20	—	—	*278	2,346	404	—	—	2,371
Essential Oils ..	"	3,660	*460	*1,516	*1,420	*526	4,956	18,890	34,540	38,489	35,794
Groundnut Oil ..	"	6,233	*157	*1	*2	—	680	660	8	12	—
Sesame Oil ..	"	89,944	*52	*31	*27	—	10,008	202	154	181	—
Potatoes ..	Cwt.	173,046	49,837	43,990	28,390	26,216	29,199	32,654	30,558	23,613	24,353
Pyrethrum ..	"	55,628	76,506	22,932	26,473	37,863	357,170	604,620	330,723	357,123	511,971
Sugar ..	"	81,463	3,707	880	1,024	860	50,308	4,508	1,746	2,412	2,800
Tea ..	"	88,627	53,009	82,514	82,452	85,579	501,732	716,641	1,333,854	1,397,278	1,315,803
Wattle Bark ..	"	226,716	118,300	35,300	42,180	2,077	72,846	111,157	34,544	48,064	61,034
Wattle Extract ..	"	131,312	439,721	482,527	444,462	480,488	91,438	888,841	978,945	1,263,848	1,685,912
Passion Fruit Juice ..	"	22,744	25,602	14,091	37,034	9,449	6,713	13,408	7,763	20,477	5,833
OTHER AGRICULTURAL PRODUCE ..	Imp. Gal.	—	—	—	—	—	54,446	523,239	371,265	409,951	163,509
TOTAL ..	—	—	—	—	—	—	3,242,495	9,635,894	14,750,178	20,721,491	22,752,477

*Unit—Cwt.

(a) Previous to 1952 the figures for Castor Seed were included in "Other Agricultural Produce."

(b) No Linseed and Sesame were exported during 1952 and the headings have been omitted from this Table; previous exports are, however, still included in the total shown.

Crops

Barley.—The actual area under barley for the 1951-2 crop was 23,321 acres as against the estimate of 24,768 acres given in the 1951 Report. Production amounted to 115,528 bags of 180 lb. as against the estimate of 133,776 bags. The average yield was thus 4.95 bags as against an estimated yield of 5.40 bags. The estimated area for the 1952-3 crop is 26,881 acres and the estimated yield 147,314 bags, giving an average yield of 5.48 bags per acre.

Cashew Nuts.—Production amounted to 323 tons of nuts as compared with 792 tons in 1951. This drop in production was due in part to the fact that the excessive short rains of 1951 coincided with the flowering period, greatly reducing the setting of the fruit, and also to a decrease in quality owing to shell pitting, a bad infestation of which affected the kernels. The crop was valued at £4,353; 40 tons of decorticated nuts were exported, valued at £14,005. The price to the producer was 12 cents per lb. of nuts, as in 1951.

Cassava.—The acreage under cassava in Nyanza Province again showed an increase, 82,000 acres being planted, compared with 74,000 acres in 1951. The estimated production was 200,000 as compared with 190,000 tons in the previous year. Owing to drought there was no surplus for sale. There was little change in the position in Central Province. In Coast Province 350 acres of European-grown cassava were planted compared with 300 acres in 1951 and both Brown Streak and Mosaic disease were greatly reduced. Considerable improvements were made in the drying of the root and production of dried cassava amounted to 152½ tons.

Castor Seed.—There was a very large increase in production despite the fact that fluctuations in price reduced the acreage in Coast Province and poor rains affected the yields. None the less the Coast produced 134 tons valued at £2,995 and Central 1,385 tons valued at £77,753 which alone exceeded the total crop marketed last year. In all 5,440 tons valued at £392,463 were exported.

Chillies.—This crop still constitutes the main cash crop in the Voi district, Coast Province. High yields were anticipated but, owing to unseasonable weather, yields were reduced and a sudden drop in prices resulted in some of the crop being left unharvested. None the less, 5,980 cwt. valued at £30,000, were marketed as compared with 4,389 cwt. valued at £24,582 in 1951.

Coffee.—The good rains of 1951 brought coffee trees back into a condition to produce the biggest crop for many years, 16,922 tons compared with 9,938 tons in 1951. Furthermore, the good prices tended to harden so that while the mean export value per ton for all grades in 1951 was £412 and totalled £4,096,317, in 1952 it was £421 per ton and £7,123,360 in total, giving coffee a clear lead over all other agricultural exports in value. The average yield per acre was 5.3 cwt. compared with 3.25 cwt. in 1951 and 2.1 cwt. in 1950. The area under European-grown coffee was 60,500 acres. When one considers that the post-war record crop of over 16,000 tons was obtained in 1952 from a much reduced acreage, the effect of better methods of cultivation can readily be appreciated. Good prices have undoubtedly stimulated production but improvements in technique resulting from research have played an important part in the improvement. There is an increasing willingness on the part of coffee growers to adopt improved methods. By the end of the year it had become apparent that the 1953 crop would be ahead of the early season estimate. The long rains of 1952 tailed off badly and the short rains virtually failed in the main coffee areas. It is considered that the carry over of soil moisture from 1951 was largely responsible for the increase on estimate.

Coffee growing by Africans continued to expand in a very satisfactory manner. There were 11,864 licensed African coffee growers, an increase of 3,656

over 1951 and the area was enlarged from 1,735 acres in 1951 to 3,038 acres in 1952. Variety trials are laid down in all potential coffee areas approved by the Coffee Research Station to test their suitability for coffee growing and to indicate the types of coffee most suited to the local conditions. Backed by sound cultural practices, this policy will pay good dividends. In the Meru district of Central Province almost a million coffee trees have now been planted and expansion is proceeding at a rapid rate. Other districts in Central Province are advancing more slowly the guiding principle being that sound cultural practices and experience must be built up before more rapid expansion is contemplated. That this policy will pay dividends is shown by the satisfactory way that heavy bearing trees at low altitudes in Meru and Embu have come through the drought due to a high standard of cultivation, mulching and manuring. Individual yield records have been kept in Meru where conditions are particularly favourable. Ten of the better growers who planted their coffee in 1935 averaged over the five years 1947 to 1951 a yield of 17.06 cwt. of clean coffee per acre, with a highest individual yield in one year of 35.01 cwt., and a lowest of 5.55 cwt. Quality has also been raised to a high level, the Chuka Society of Meru winning the Kenya Coffee Board's cup for African growers with a coffee of very high standard. Nyeri district obtained a Class I for 29 bags A and P.8.

The area under coffee in the Kisii Highlands of South Nyanza district reached 472 acres, an increase of 102 acres over 1951. Of this, only 205 acres were in bearing. The coffee union of twelve primary co-operative societies operated twelve pulping stations. Sales totalled 26.5 tons of parchment coffee and 12.7 tons of "buni", valued at £6,982. Although both the co-operative societies and the preparation of the coffee require much closer supervision than they at present receive, the quality of the parchment coffee improved, the bulk of the crop being in class 4. In the Kimilili (Mount Elgon) area of North Nyanza district, 692 growers had by the end of 1952 planted 168 acres, some of which will come into bearing in 1953. While the standard of cultivation maintained by the growers was generally satisfactory, closer supervision is required in this area.

Interest in coffee growing in the Teita Hills of the Coast Province has revived somewhat although hampered by the dry year.

Copra.—The campaign against Rhinoceros Beetle was successfully carried out during the year on the south coast. Although there was no decrease in the tapping of coconuts for palm wine and local shortages of food resulted in a high proportion of the nuts being consumed as food, yields were so good that the quantity of copra marketed showed a substantial increase over the previous year, 1,362 tons valued at £64,770 being marketed as against 317 tons valued at £15,780 in 1951.

Cotton.—Because of the good 1951-planted crop, production of cotton lint in Nyanza Province increased in 1952 to 12,058 bales of which 10,528 were A.R. compared with 8,594 bales in 1951. The acreage planted to cotton in 1952 increased from 50,000 to 60,000 but yield is expected to drop to 8,000 bales accounted for partly by late planting after dry weather in June and July and partly by a high incidence of American Bollworm, *Lygus* and Blackarm. Prices paid to growers were 49 cents per lb. of seed cotton for A.R. and 17 cents for B.R. (1951: 44 and 15 cents respectively.)

In the Coast Province the land prepared for planting increased substantially but the seed issued was of such poor quality due to the previous wet year, that virtually all areas had to be replanted with cotton seed imported from Nyanza Province. This late planting was partially droughted and was marketed in early 1953. The yield from the 1951-planted crop sold in 1951-52 totalled 4,445 bales, of which 3,948 bales were A.R.

As in former years the Nyanza crop was marketed through the Uganda Lint Marketing Board, two-thirds of the crop being sold on forward contract to the Government of India and the United Kingdom Raw Cotton Commission, and the remainder by public auction. The Coast crop is sold by tender and full advantage was gained in the early sales of enhanced prices; at the latter end of the season prices dropped sharply, but notwithstanding substantial profits accrued to both the Nyanza and Coast cotton sales funds, which will provide for price assistance in the event of prices dropping in future years, and with monies surplus to this requirement, development projects in their respective cotton areas.

Essential Oils.—Exports declined markedly from 71 tons in 1951 to 26.3 tons but the value per ton increased very considerably, the total export value being £35,794 as against £38,489. The amount of geranium oil exported increased from 38½ cwt. last year valued at £15,240 to 60 cwt. valued at £26,166.

Flax.—Production of this crop is now mainly confined to the Molo area of the European Highlands where conditions are optimum for its growth and yield. Export increased slightly from 39 tons in 1951 to 42 tons, but the value fell from £9,350 to £8,240.

Groundnuts.—In Nyanza, the main producing area, the acreage decreased as the price to the grower at planting time was unattractive. Sales amounted to 866 tons valued at £24,251 as compared with 1,813 tons valued at £36,560. Groundnut oil delivered to Control amounted to 17,191 tins (of 36 lb.).

Kapok.—Yields were good but sales fell from 229,263 lb. valued at £9,170 in 1951 to 61,776 lb. valued at £1,600. Growers received 60 cents per lb.

Linseed.—Actual crop production for the 1951-52 crop was 5,015 bags (200 lb.) from 2,933 acres giving a yield per acre of 1.70 bags, as compared with the estimate of 4,171 bags from 3,066 acres. The estimated figures for the 1952-53 crop are 7,743 bags from 4,047 acres, giving an estimated yield per acre of 1.91 bags.

Maize.—For the first time in probably 25 years this crop comes third in value in agricultural exports; this large export in terms of value if not in volume was occasioned by a bumper 1951-52 crop in the producing areas and a satisfactory internal food position following good rains in the main consuming areas. Although storage in producing centres is being built up with a view to providing space for 50 per cent of the optimum crop, yet facilities were this year stretched to the utmost, and if severe deterioration due to insect damage was to be avoided it was necessary to export a large proportion of the surplus. In the European areas of Rift Valley Province it was estimated that 133,100 acres of maize were planted compared with 118,000 in 1951. Although the unfavourable weather conditions precluded good yields, nevertheless crop expectations were up to average. The land under non-native maize in all areas of the Colony was estimated to be 145,934 acres, expected to produce 999,584 bags or an average of 6.80 bags per acre compared with 141,924 acres, 1,222,882 bags and 7.81 bags per acre actually grown in the 1951-52 season.

In the African areas the biggest surplus production of maize comes from Nyanza Province where it is also the basic food crop so that local needs must first be met. For this reason adverse weather conditions led to a drop in the surplus

expected from the 1952 planting to 55,000 tons from 65,724 tons in 1951-52. The Central Province surplus sold on markets rose by 8,000 tons to 17,121 tons. Deliveries to Control were:—

	1950-51	1951-52
	<i>Bags</i>	<i>Bags</i>
Non-African Areas	751,018	751,060
African Areas	985,292	1,091,753
	1,736,310	1,842,813

Mr. L. G. Troup, Commissioner, appointed to recommend prices for the 1951 maize and wheat crops and to report on the basis for future calculations of cereal prices recommended that the price of maize be raised from Sh. 30/30 per bag naked to Sh. 35 per bag naked for 1951. Subsequently the price for the 1952-planted crop was fixed at Sh. 38/25 per bag naked by Government following the basis recommended by Mr. Troup.

Oats.—There was a further increase in the acreage under oats planted in 1952, the estimated area and production being 21,000 acres and 127,190 bags of 150 lb. each (6.05 bags per acre) compared with actual plantings of 16,271 acres and yields of 67,740 bags (4.28 bags per acre) in 1951-52.

Other Cereals.—Although the drought resistant cereals such as Sorghum, Bulrush Millet, Finger Millet and Foxtail Millet should in the drier areas be grown in preference to the more popular maize, nevertheless only 21,351 bags of these crops came on to the markets in Central and Nyanza Provinces in 1952.

Passion Fruit.—The area under passion fruit decreased from 617 acres in 1951 to 503 acres. Production dropped very considerably from 24,669 gallons to 9,640 gallons, due in part to a loss of interest in the crop owing to the collapse of the Australian market and in part to the losses caused by brown spot and “woodiness” disease.

In the second half of the year negotiations with Australia were re-opened and some new plantings were made. Local sales amounted to 660 gallons. Exports were down to 9,449 gallons, valued at £5,833 as compared with 37,034 gallons, valued at £20,477 in 1951.

Potatoes.—Owing to the failure of the short rains, plantings were small in Nyanza Province. In Central Province there was a shortage of planting material created by the heavy blight attacks of 1951 and short rains crops suffered a good deal from drought throughout Kikuyuland. In the upper areas, particularly in Meru district, however, good crops were harvested. Sales, however, showed a slight decline from 5,469 tons, valued at £58,065 in 1951 to 5,285 tons valued at £51,763. Exports declined from 1,419 to 1,110 tons, but the value increased from £23,613 to £24,353. The Forest squatter production of potatoes in Rift Valley Province is the mainstay both for local consumption and for export.

Pulses.—Yields of beans were again adversely affected in Nyanza Province, first by the very heavy long rains and then by drought later in the year; good or fair crops of most legumes were obtained in Central Province. Green Gram is a popular crop in the Tana River and inland of Kwale and Kilifi Districts of Coast Province and the Tana River crop did well despite adverse weather conditions.

Deliveries to Control were 3,045 bags compared with 1,024 bags in 1951. Heavy plantings of Cowpeas were made in all districts but lack of rain and intense heat reduced the crop by over one-third. The quantities of the principal pulses delivered to Control were:—

	1950-51	1951-52
	Tons	Tons
Beans, various	3,861	11,070
Field Peas	505	675
Cowpeas, grams and others	2,890	5,480

Sales of all kinds of pulses from the Central Province to Control amounted to 14,481 tons as compared with 9,590 tons in 1951, mainly derived from 1951 short rains' plantings. Exports rose markedly, 151,035 cwt. of beans and peas valued at £254,627 and 30,611 cwt. of other pulses valued at £64,035 being exported as compared with 30,609 cwt. valued at £70,935 and 16,234 cwt. valued at £35,054 respectively in 1951.

Pyrethrum.—The area licensed in 1952 was 22,941 acres compared with the revised area under pyrethrum for 1951 of 16,550 acres. Production rose from 1,892 tons in 1951 to 2,451 tons in 1952. Of this 1,893 tons valued at £511,971 were exported. Labour for picking was forthcoming despite the Emergency. Growers were paid out at Sh. 2/58 per lb. of pyrethrum flowers on the basis of a pyrethrin content of 1.5 per cent, the equivalent payment for 1951 being Sh. 2/45.

In Central Province 388 Africans had planted 799 acres from which sales expanded from 95,407 lb. of flowers in 1951 to 185,661 lb. in 1952. Acreages are still increasing and it is hoped to canalize this development through co-operative societies. In Kiambu, where three-quarters of the pyrethrum is grown at present, individual growers have sold direct to the Pyrethrum Board. It is now hoped to establish three centres from which large parcels can be dispatched in place of the innumerable small lots sent by individuals at present.

Rice.—The area under rice in Nyanza Province decreased from 10,100 acres in 1951 to 5,000 in 1952 owing to the fact that in North Nyanza the heavy rains in the early part of the year made ploughing of the swamps impossible. None-the-less production was maintained and sales increased, due to a further development in the growing of transplanted, irrigated rice on the Kano plains. The Department's seed distribution work also effected an improvement in quality, two-thirds of the paddy purchased in 1952 being pure, whereas in 1951 half was of mixed varieties. In the Coast Province the acreage planted was greatly reduced by drought; much of that planted produced little or no crop and the little that survived and came to maturity was completely destroyed by a plague of birds. 21,847 bags (of 150 lb.) from Nyanza Province were marketed, valued at £21,847. Rice growing under irrigation is still in the experimental stage in the Embu and Meru districts of Central Province but the indications are that there is a good potential in the Mwea Plain of Embu.

Sisal.—The sisal industry suffered a major set-back in the price of its product which started the year at £213 per ton for No. 1 c.i.f., U.K., rose to £230 in April, dropped to £143 by the end of May, to £90 in mid-August and ended the year at £100. The overall average price in 1952 covering all grades exported was £126. That the total value of exports did not decline so drastically was due to forward sales but the expectation of revenue to Government from the export tax applied at the end of 1951 only realized £187,250 or £5.3 per ton of sisal exported. The acreage under estate sisal rose from 234,127 acres in 1951 to 248,903 in 1952

of which mature acreage cut was 112,025 acres. Production in 1952 was 35,938 tons compared with 41,357 tons in 1951. The drop of 5,419 tons was due to the decrease of African unwashed fibre and to labour shortage. Exports dropped from 38,825 tons in 1951 valued at £6,948,160 to 35,273 tons valued at £4,469,588 in 1952.

The trade in African unwashed sisal fibre finished at the end of 1951 and, following the collapse of the export price in May, sales of sisal leaf to licensed buyers dropped to a very small scale because the price could not carry high transport costs. The reorganization of the Machakos African Sisal Scheme, financed by the African District Council, whereby washed fibre was purchased, brushed and baled, made good progress, a temporary factory being used at Athi while a permanent one was being constructed at Machakos. The factory ran at a loss in the initial stages because large quantities of fibre had been purchased while prices were high. With readjustment of prices to producers, the scheme can be run at a profit. The good quality of sisal turned out under the mark "M.A.S." has created a demand on overseas markets for Machakos fibre.

Sugar.—Weather conditions were again favourable during the first eight months of the year in Nyanza Province. The production of cane on the Miwani Estates increased from 67,961 tons in 1951 to 88,024 tons while the purchases from the Kibos Indian farmers rose from 28,178 to 33,018 tons. The production of jaggery on the Indian farms increased from 1,200 tons in 1951 to 1,810 tons and, because of the removal of control over its price, the value of sales rose from £18,660 to £39,417.

In the Coast Province, despite adverse weather conditions, good yields were obtained. The area under sugar cane rose to 19,500 acres in Nyanza and to 7,000 at the Coast. Production of refined sugar fell slightly from 13,724 tons in 1951 to 13,014 tons in 1952.

Sunflower.—Actuals for the 1951-52 crop year were 22,977 acres producing 112,851 bags (100 lb.), a yield of 4.91 bags per acre compared with the estimate of 25,685 acres yielding 145,326 bags. Estimates for the 1952-53 crop year are 30,106 acres, 132,540 bags or an estimated yield of 4.40 bags per acre. Exports for the 1952 calendar year were 4,446 tons, valued at £183, 319 compared with 3,225 tons, valued at £147,797 in 1951.

Tea.—A good crop of tea was realized in Nyanza Province, the late rains of 1951 producing heavy pluckings at the beginning of the year. Little hail damage was experienced and the area planted to tea continued to expand in North Sotik and Nandi.

The average wholesale price of Sh. 3/14 per lb. for local sales and the ex-factory price to the producer of Sh. 2.439 per lb. fixed in October, 1951, were reduced in August, 1952 to Sh. 3/02 and Sh. 2/30 per lb. respectively to offset an increase in the profit margin in the retail price applied by the Nairobi Grocers' Association. Export prices were affected by modifications and, in October, by removal of both rationing and price control in the United Kingdom. During the year world production of tea appeared temporarily to outstrip demand and prices for the lower qualities dropped to uneconomic levels, although East African teas maintained a reasonable position in overseas markets. Towards the end of the year the price of better grades began to recover.

The total planted area at the end of 1952 was 21,011 acres compared with 19,873 acres a year earlier. Production was 14,788,741 lb. compared with 15,326,008 lb. in 1951. Local consumption was 6,913,053 lb. while 9,584,848 lb. of made tea valued at £1,315,803 were exported against 9,234,624 lb. valued at £1,397,278 in 1951.

In Nyeri District under the scheme for tea growing by Africans, 35 acres had been planted, standards of cultivation being high and the tea surviving the drought well. A large nursery will supply the tea seedlings to expand the final area to 500 acres by 1958. Plans for the tea factory and machinery were under consideration, the aim being to produce high quality tea.

Tobacco.—Flue-cured tobacco continued to be produced in the Fort Hall, Embu and Kitui districts of Central Province by the East African Tobacco Company from green leaf purchased by them from Africans who had obtained their tobacco seedlings from the Company's nurseries. A good crop was harvested in early 1952 from the 1951 short rains planting, while the long rains' crop was variable. Purchases in 1952 amounted to 1,020,027 lb. of green leaf valued at £2,825 compared with 1,334,342 lb. and £3,119 in 1952. Prices to the grower remained static at 7, 5 and 3 cents per lb. for the three grades of green leaf. Experimental plantings are taking place in the Meru District. The production of snuff tobacco is far more lucrative to the grower than the sale of green leaf. Fair crops were obtained in Central Province while the main source of revenue on Pote Island in the Lamu district was the sale in 1952 of 40 tons of cured leaf, most of it going to Somalia.

Vegetables, Fruit and Flowers.—In Central Province the area of African-grown pineapples again increased and is now estimated between 2,500 and 3,000 acres. Some 3,500 tons were produced valued at £40,000. It was again a good year for fruit and vegetables and increased plantings of tomatoes, strawberries and onions in the Machakos district did particularly well. Production of mangoes is also increasing. This is one of the few fruits which Africans like to eat and for which they appear to be prepared to pay. Bananas were plentiful for most of the year, though affected by drought towards the end. There was a big increase in banana growing in the Machakos District in deep trenches on the contour. Total production in the Province, including pineapples, amounted to 13,838 tons, valued at £146,604, as compared with a value of £145,079 in the previous year.

In the Coast Province, vegetables still remain the most important cash crop in the Teita Hills, though production continues to fall, 1,424,640 lb. being produced, as against 1,662,545 lb. last year. There is, however, a slow but steady increase in the number of plots being terraced and irrigated for vegetables. The quality of African-grown citrus remains poor, since, with very few exceptions, no attempt is made to raise good stock or tend existing trees. A number of European farmers are buying citrus seedlings from Matuga, but these are not yet in production. The mango season was the best for some years. Recent plantings of choice varieties, e.g. Ngowe and Boribo have started fruiting in some areas, particularly in Malindi, and plantings still continue by many growers along the Coast. An Asian estate on the South Coast has established a 400-acre plantation of improved types. It is well looked after and the trees were flourishing by the end of the year. Acreages under pineapple increased but growers were hampered by difficulty in obtaining suckers. Total sales of fruit and vegetables in the Coast Province amounted to 9,528 tons valued at £129,300.

Wattle.—Although the Kikuyu districts, the main African wattle-growing areas in the Colony, were the areas principally affected by the Emergency, the production of wattle bark in Central Province (32,507 tons) showed an increase over the previous year (29,395 tons). There was a slight increase in the area (12,300 acres) and production (736 tons) of wattle bark by Africans in the Kericho District and Kisii Highlands. Production in the Teita Hills of Coast Province dropped from 427 tons in 1951 to 356 tons in 1952 but the marketing of this crop was regularized. Planting in the European areas of Nyanza Province was extended from 860 to 1,250 acres and reached 62,578 acres in the Uasin Gishu where sales of wattle

bark rose from 7,042 tons in 1951 to 8,062, the pay-out to growers being £126,000 and £146,000 respectively. The quality of bark delivered gave cause for concern.

	1951 Tons	1952 Tons
<i>Dried Wattle Bark Bought</i>		
African Areas	33,641	36,356
European Areas	11,767	8,448
	45,408	44,804
<i>Wattle Extract Exported</i>	22,223	24,024
Value	£1,263,848	£1,685,912

In addition 2,689 tons of green bark were sold from African areas and 5,007 tons from European Areas.

Wheat.—With heavy short rains in November and December, not normally experienced in most parts of the main wheat-growing areas, the 1952 harvest was probably one of the most difficult, although fortunately not one of the most disastrous on record; of the total wheat for delivery some 200,000 bags were musty and sprouted to a varying degree: some of this amount could be accepted and blended in with the better qualities for local milling, but some 100,000 bags had to be exported, after conditioning at the Port, for stockfeed. It was fortunate that the price obtained for this sprouted wheat approximated fairly closely to that ruling for wheat of millable quality.

There is a continued tendency to increase the acreage under wheat in Rift Valley Province and while the estimated planting of 286,000 acres in 1952 showed a rise of 22,600 acres over 1951, the crop was affected by late planting conditions, poor late rains, a localized attack of Aphis in Nakuru District and the depredations of grain-eating birds which, in turn, required a revision in acreage and yield estimates. For the Colony wheat production was:—

	1951-52 (Actual)	1952-53 (Estimate)
Acreage	293,490 acres	294,272 acres
Production	1,253,855 bags	1,305,459 bags
Yields per acre	4.27 bags	4.43 bags

Mr. L. G. Troup, Commissioner appointed to report on the 1951 price of wheat and the basis for calculating future cereal prices, recommended a price of Sh. 46/33 per bag naked, Sh. 1 above the price earlier fixed by Government for the 1951 crop. Subsequently for the 1952 planted crop, following the basis recommended by Mr. Troup, Government fixed the price for Grade I at Sh. 52/06 per bag naked.

Livestock Products

Bacon and Lard.—There was a slight decrease in deliveries of pigs to the factories.

	1951	1952
Baconers	43,264	43,535
Porkers	14,641	13,483
Larders	5,089	3,990
	62,994	61,008

Exports of bacon and ham amounted to 24,556 cwt. valued at £257,556 compared with 25,545 cwt. valued at £253,660 in 1951.

Butter.—Creamery production continued to increase from 7,537,136 lb. in 1951 to 9,137,699 lb. in 1952 of which 6,692,670 lb. were consumed locally and 23,533 cwt. valued at £391,123 were exported. The average pay-out for Grade I butterfat was Sh. 2/89 per lb.

Cheese.—Production of cheese by the creameries amounted to 591,990 lb. compared with 580,650 lb. in 1951. Of this, 26,651 lb. was exported valued at £3,419.

Eggs.—Sales of eggs from Nyanza and Central Provinces were 59,282 gross compared with 57,493 gross in 1951 and comparative values were £49,030 and £40,559.

Poultry.—Sales of poultry totalled 295,277, mostly from Central Province, valued at £26,200 as against 231,394 head in 1951.

Hides and Skins.—At 73,817 cwt. total exports were valued at £1,069,776 compared with 94,406 cwt. valued at £2,156,057 in 1951. Exports in 1952 were:—

	Cwt.	Value £
Cattle hides (shade-dried)	42,782	563,613
Cattle hides (sun-dried)	2,450	29,611
Calfskins and kips (shade-dried) ..	177	2,750
Calfskins and kips (sun-dried) ..	—	—
Sheepskins and lambskins (shade-dried)	8,752	113,792
Sheepskins and lambskins (sun-dried)	644	5,243
Goatskins and kidskin (shade-dried)	11,230	275,307
Goatskins and kidskins (sun-dried)	1,219	19,635
Other hides and skins	6,563	54,825

Slaughter Stock.—The following are comparative figures of purchases by the Meat Commission:—

	1951	1952
European-owned cattle and calves ..	39,255	29,635
African cattle	13,145	16,804
European-owned sheep and goats ..	20,266	24,525
African sheep and goats	69,081	86,025

Wool.—Exports of wool amounted to 12,024 centals (100 lb.) valued at £240,689, a decline compared with 1951 exports of 14,688 centals valued at £379,240.

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETING (PARTLY ESTIMATED)

PRODUCE	UNIT	NYANZA PROVINCE		CENTRAL PROVINCE		COAST PROVINCE	
		Quantity	Value £	Quantity	Value £	Quantity	Value £
Beeswax	36 lb.	—	—	2,327	11,042	—	—
Cashew Nuts	Cwt.	—	—	—	—	6,478	4,353
Cassava	Tons	—	2,298	—	—	564	6,317
Chillies	Cwt.	423	—	—	—	5,980	30,000
Coffee (Parchment)	—	—	6,982	1,229	40,020	—	—
Coffee (Buni)	—	530	—	1,588	—	—	—
Copra	—	254	—	—	—	—	—
Coriander	Tons	—	—	—	—	1,362	64,770
Castor Seed	180 lb.	—	—	2,514	3,391	—	—
Cotton (Seed)	Tons	—	—	1,385	77,753	134	2,995
Cotton (Lint)	Lb.	11,760,000	276,000	—	—	5,549,396	126,632
Eggs	400 lb.	23,131	16,654	36,151	32,376	—	—
Charcoal	Gross	—	—	66,540	22,781	—	—
Ghee	Bags	—	—	503	1,796	—	—
Groundnuts	36 lb.	22,944	43,352	—	—	—	—
Hides	Tons	866	24,251	—	—	—	—
Kapok	36 lb.	85,813*	?	14,568	65,202	—	—
Maize and Maize Meal	200 lb.	736,109	827,505	—	—	1,716	1,600
Millet and Sorghum	200 lb.	9,867	9,192	188,336	259,000	—	—
Miraa (<i>Catha edulis</i>)	Tons	—	—	11,484	12,393	—	—
Potatoes (English)	180 lb.	6,023	?	38,000	28,500	—	—
Poultry	Heads	13,051	2,110	59,194	51,763	—	—
Pulses	200 lb.	12,051	26,169	282,226	24,090	—	—
Pyrethrum	Lb.	—	—	142,590	287,419	8,136	11,736
Rice (Paddy)	150 lb.	21,847	31,160	185,661	12,765	—	—
Sesame	180 lb.	1,376	3,363	—	—	3,000	4,490
Sisal Fibre	Tons	—	—	—	—	62	155
Skins	Score	—	—	8,952	29,308	—	—
Tobacco, Green Leaf	Lb.	—	—	22.5	2,003	—	—
Tobacco, Native Cured	Tons	—	—	69,716	112,704	—	—
Vegetables, Flowers and Fruit, including Bananas	—	—	—	1,020,027	2,825	—	—
Wattle Bark	—	—	—	—	—	50	5,600
Wheat	200 lb.	646	7,598	13,838	146,604	9,258	129,300
		1,736	2,728	32,507	446,896	356	3,990

*Number

PART II—RESEARCH AND SPECIALIST SERVICES

Although the rate of progress still leaves much to be desired, it is possible to report that in 1952 a distinct advance was made in the improvement and extension of the Research and Specialist Services of the Department, the capital cost of which is largely provided for by a Colonial Development and Welfare Fund Grant of £218,000 which was made available at the end of 1950. The least satisfactory section is that of Pasture Research, where progress was hindered by a long delay in obtaining the approval of the modifications to the original plan suggested by Dr. William Davies, and by difficulty in obtaining a suitable leader for the team, but by the end of the year the development of the Central Station at Kitale and the High Altitude Station at Marindas was well under way, a senior officer had been appointed, and a great deal of useful work initiated. Lack of a suitable officer has, however, so far prevented our starting work for the benefit of the drier ranching areas. With the exception of the new coffee factory, the extensions to the Coffee and Horticultural Research Stations have been finished. At long last a start has been made on another major part of the scheme—the building of new central laboratories for the specialist officers in Nairobi. In three of the four provinces the development of the new main experimental stations has been nearly completed and a considerable programme of experimental work was initiated at each of them during the year, but in Nyanza Province negotiations for land for the main sub-station have still not reached a successful conclusion. For the first time it was possible to post to all provinces an Agricultural Officer and an Assistant Agricultural Officer whose duties are confined to experimental work and this has had a most beneficial effect, especially on investigations in African areas. The establishment of a small cotton experimental station at Kibos, in Nyanza Province, and two sub-stations at Bungoma and Homa Bay, with money derived from the Cotton Sales Fund, was virtually completed and the officer posted to Nyanza by the Empire Cotton Growing Corporation in 1951 has been able to get well forward with a useful programme of work.

Six new qualified officers were appointed, bringing the number of Specialists and Agricultural Officers in the division up to thirty, as against a total establishment of thirty-five. The programme of experimental work was appreciably expanded especially in African areas, and co-ordination and direction of work has been improved through the medium of a small departmental committee. The collaboration of the East African Agriculture and Forestry Research Organization in a number of projects has been a valuable asset.

General Husbandry

AFRICAN AREAS

The main object of experimental work is to obtain information which will enable sound farming systems, capable of maintaining or improving both soil fertility and production, to be evolved for the varying ecological conditions of different parts of the Colony. This involves work, not only on the basic essentials of the system, such as the type of land use or rotations to be followed, but also on a variety of other factors which may contribute to improved farming, such as the use of fertilizers and manures, methods of cultivation, and improved varieties of food and cash crops. At present there are no really comprehensive and long-term experiments in progress to study the effect of various resting crops, rotations or grass-arable ratios on the maintenance of fertility, as at this stage it is considered wiser, at any rate as a first step, to obtain information on a number of component factors by separate experiments.

Over a large part of the African areas the policy is the introduction of mixed farming based on the alternation of grass and arable cropping. This policy applies to a wide range of conditions, varying from the high rainfall and good soils of

the Kipsigis country, which is ideal for intensive mixed farming, to the much drier climate and poorer soils of parts of Machakos District which may be regarded as marginal for this type of agriculture. In consequence a good deal of attention is being given to ley establishment and management under a considerable diversity of ecological conditions. In the wetter areas it has already been shown that leys can be established with certain species and work is now moving towards improved species and methods of establishment and investigation of management and carrying capacity. Several trials in Nyanza Province have shown that Molasses grass, Rhodes grass, Star grass and *Paspalum dilatatum*, over a period of two or more years, can all carry an average of $1\frac{1}{2}$ to $2\frac{1}{2}$ beasts per acre throughout the year. Establishment trials were conducted in 1952 with molasses, Rhodes, Pemba grass (*Stenataphrum dimidiatum*) and *Brachiaria brizantha* and results indicate that all these can be satisfactorily established under maize or sorghum at normal spacing, early planting of the grass, application of farmyard manure and, usually, phosphate, being advantageous. It was noted in last year's Report that satisfactory methods had been found for the establishment of leys with Rhodes grass, star grass, *Panicum makarikariensis* and a mixture *Cenchrus ciliaris* and *Eragrostis superba* on eroded land in the relatively dry central part of Machakos District. This experiment has now proceeded to a second stage—that of assessing the carrying capacity of leys under various systems of management. For the drier, and more marginal conditions further south in Machakos (e.g. Makueni) and in parts of the Coast Province, the ley establishment problem has not been fully solved, although planted star grass has proved satisfactory and there is little doubt that certain sown species, e.g. *Cenchrus ciliaris*, will also be successful. Difficulties have hitherto been experienced in the higher altitude areas of the Central Province where, under high rainfall and under rather poor, leached soils, the land has remained undeveloped under a cover of bracken and poor grasses, but some promising grasses have now been found, notably molasses and *Panicum maximum*, which can be established with the aid of farmyard manure and/or phosphate. A much more effective use of these high areas is important as they form part of the densely populated Kikuyu Reserve.

Fodder crops for dry season cattle feed form an important component of the farming system, especially in the drier areas, and a number of species, both gramineous and leguminous, alone and in combination, are under trial at various stations. Applications of farmyard manure and/or phosphate have commonly effected very considerable increases in yield.

Fertilizer experiments have indicated a very marked response to phosphate over wide areas. In Nyanza Province 25 simple exploratory trials and 13 more complex experiments on rates of application and methods of placement were conducted in continuation of the fertilizer work carried out by the East African Agriculture and Forestry Research Organization over the previous three years. They again showed that phosphate response is obtained on the red earths and extended our knowledge of responding areas and rates of application. Experiments in the Central and Coast Provinces also produced marked phosphate responses on volcanic red earth, red sandy loams derived from granite and the red sandy soils of the Coast, but not on the calcareous soils at the Coast. Phosphates are likely to be important in many African areas but sound recommendations cannot be made until more is known about optimum rates of application, residual effects, the most economic form of phosphate to use and the extent to which the benefits obtained from phosphates are also conferred by farmyard manure. Experiments on these points are already in progress and it is noteworthy that quite small applications of superphosphate are effective. It may well be that the use of this fertilizer in a granulated form, carefully placed, will prove to be the most economic means of providing phosphate on many soils.

The use of farmyard manure has proved almost universally beneficial but we need to know a great deal more about optimum rates of application, residual effects, the relative response of different crops, and the interaction between manure and phosphate. A series of experiments has been started to obtain this information.

Over a great deal of Kenya it is likely that soil moisture is a major limiting factor to crop yields and that cultural methods which would enable a more efficient use to be made of the limited rainfall would be advantageous. Experiments on the use of tie-ridging and mulching, combined with farmyard manure and/or phosphate, were begun at stations in the Coast, Central and Nyanza Provinces in 1952. As many of the experiments were on new land it is hardly to be expected that the treatments will have had their full effects in the first season but evidence of crop increase from both ridging and mulching was obtained under rather dry conditions in the Coast and Central Provinces.

In the field of crop improvement, little progress was made in 1952 towards obtaining a good short or medium-term sorghum for the drier areas but three imported short-term maize varieties showed promise at the Coast. In a trial of 25 rice varieties in Nyanza yields of up to 2,500 lb. of padi per acre were obtained but none of the varieties tried was better than Sindano, which is already commonly grown and is of good milling quality. The testing of cassava varieties received from Amani for resistance to mosaic and brown streak continued at Matuga, Gombato and Embu. At Matuga the majority of the varieties showed little mosaic infection but on the nearby Gombato Estate, where the material was subjected to more massive infection, a much higher proportion of the varieties showed marked symptoms of the disease. Preliminary yield trials at Gombato, in which plots were harvested after different periods of growth, showed that with most varieties the greatest yield increment is obtained between 12 and 18 months, yields harvested at 9 or 12 months from planting being small.

Work on cash crops includes experiments with coffee, cotton, coconuts, pyrethrum, tea and fibre plants. The cotton work is mainly being carried out in Nyanza Province by an officer posted to Kisumu by the Empire Cotton Growing Corporation and comprises breeding and variety trials, and seed dusting trials aiming at minimizing seedling blackarm infection. The latter have confirmed the beneficial effects obtained in Uganda and all Nyanza cotton seed will be dressed with Perenox in 1953. Cotton variety trials were also carried out in the Coast Province. A very considerable number of coffee variety trials have now been established in Meru, Embu, the Kisii Highlands and North Nyanza, in all of which areas the cultivation of this crop is making good progress. Experimental work on coconuts on the Coast has been held up because the incidence of major damage due to the insect *Theraptus* sp. renders the selection of high yielding palms difficult and causes high variability yields in experimental plots, but towards the end of the year it was possible to post an entomologist for work on the control of this pest and of the Rhinoceros beetle. Fibre crops are mentioned below, under European areas.

EUROPEAN AREAS

Experimental work was carried out at stations at Kitale (6,000 ft.), Eldoret (7,200 ft.), and Ol Joro Orok (7,800 ft.); on departmental plots at Rongai (6,000 ft.), Njoro (7,100 ft.), Marindas (9,200 ft.), Londiani (7,500 ft.) and on farms. Much of this work comprised crop variety trials and ley trials, which were conducted in collaboration with the Senior Plant Breeder or the Senior Pasture Research Officer and are mentioned elsewhere under the appropriate headings.

Following upon the work of the Highland Fertilizer Scheme, in which numerous and widespread experiments were conducted on the fertilizer requirements of

wheat and maize, the present trials are directed chiefly to obtaining information on certain soils and crops not covered by the previous experiments and to the study of residual and cumulative effects of phosphate. Experiments on the use of drainage and phosphates on "vlei" soils, now being brought under cultivation for wheat production, have shown that whereas in some areas, e.g. the Kinangop, the effects of phosphate are spectacular, in others, e.g. Londiani, the benefit from the fertilizer is comparatively small. This matter is to be further investigated by pot experiments on the different soils with the drainage factor eliminated and by field experiments in which levels of phosphate application will be combined with various methods of drainage. Fertilizer experiments with barley at Molo, Njoro and Ol Joro Orok showed that at all three centres 75 lb. double superphosphate significantly increased yields, grading percentages and mealiness. At Njoro it also increased the 1,000-corn weight. Nitrogen and potash had little effect on yields and grading percentages, but the former decreased and the latter increased mealiness at two centres. The nitrogen content of the grain was only affected by potash, which tended slightly to reduce it.

Long-term experiments were begun at Eldoret and Ol Joro Orok to study the residual and cumulative effects of phosphate as superphosphate, sodaphosphate and Uganda rock when applied in the first year only and for two and three consecutive years. In the first season, apart from the expected response to the first two forms of fertilizer there was a somewhat unexpected beneficial effect from the direct application of Uganda rock to wheat at Eldoret. This cheap form of phosphate has rarely been beneficial when applied to cereals in the Highlands and a further long-term experiment has started at Eldoret to compare the effect of the three types of phosphate, both on the ley and on the following arable crops, when they are applied to the ley at the time of its establishment and also subsequently as a top dressing. In the first season the beneficial effect of phosphates on ley establishment in this trial was most marked.

Two trials were undertaken on the effect of various treatments on straw decomposition and the alleged crop reduction after ploughing in cereal straws at the higher altitudes. In both the application of sulphate of ammonia was beneficial, but the problem requires further investigation involving the trial of various times and methods of incorporating the straw with the soil and the use of a legume undersown in the cereal.

Fodder crop variety trials included a number of varieties of *Dolichos*, lupins, kale, rape and Japanese giant radish. In a sunflower trial at Eldoret the five dwarf and two giant varieties were tested and the former proved superior. Safflower grew well in a fertilizer trial at Rongai but is not likely to become a popular crop and work on it will be discontinued.

At a number of stations in both the European and African areas preliminary observations were made on a number of plants which might be suitable for the production of bag-making fibre as a substitute for jute. The plants tested included ten indigenous and ten imported strains of *Hibiscus cannabinus*, nine other *Hibiscus* species, seven of which are indigenous, three species of *Abutilon*, *Malva verticillata*, *Pavonia schimperiana* and *Urena lobata*. A large number of these plants can be discarded as a result of this year's observations, on account of poor growth, excessive branching, thorniness, etc. Three indigenous and three imported strains of *H. cannabinus* showed considerable promise, but a good deal more investigation into planting times, spacing, etc., would be necessary before recommendations could be made for their cultivation. *Malva verticillata* and *Hibiscus greenwayii* may also be worth further attention.

Grassland

in accordance with the recommendations made by Dr. William Davies, priority has been given to the development of the main Grassland Research Station at Kitale and the high altitude station at Marindas. Development of the former was held up for a considerable period by a long delay in obtaining approval for expenditure on the modified plan recommended, but building was well forward by the end of the year and a considerable amount of experimental work had started. In the absence of an officer with suitable experience it has not yet been possible to start work for the ranching areas at Naro Moru station, and it has become evident that our resources will not permit of our continuing to finance a sub-station at Kabete which, accordingly will be closed early in 1953. For the greater part of the year the team was without a permanent Senior Pasture Research Officer, but was fortunate in having the services of Mr. J. O. Green who, through the kindness of Dr. Davies, was seconded to Kenya from Drayton for a year. In September Dr. E. Bumpus arrived on appointment as Senior Pasture Research Officer.

Priority continued to be accorded to ley problems. At Kitale a very large collection of species and ecotypes of grasses and legumes has been established and strains of some of these, notably *Panicum maximum*, *Bracharia brizantha*, *Paspalum dilatatum*, *Setaria sphacelata*, *Cenchrus ciliaris*, *Alysicarpus glumaceus*, *Dolichos* sp. ex Kilima Kiu, *Glycine javanica* and *Stylosanthes gracilis* have passed beyond the preliminary plot stage to studies in grass-legume combinations under the grazing animal and seed production experiments. Amongst the grasses there is much promising material but although there is an exceedingly wide range of indigenous legumes few of them appear to be capable of making a really useful contribution to the sward. An exception is to be found in those areas where *Trifolium semipilosum* grows well, and work on strains and seed production of these species is in hand at the high altitude station.

A large number of trials were carried out on departmental plots and farms in the Trans Nzoia, Uasin Gishu, Londiani, Molo, Nakuru and Kinangop districts, chiefly with reference to the testing of species, the use of fertilizers and ley establishment under cereals. At the higher altitudes cocksfoot, Kentucky 31 fescue, *Phalaris tuberosa* and the rye grasses are all promising and all are already in use to some extent on farms. At medium altitudes, particularly in the Rongai, Njoro, Subukia and Londiani areas, a strain of *Setaria sphacelata* developed by D. C. Edwards, is extremely promising and will be put into more intensive trials over a wide area in 1953. Lucerne is a promising legume in many districts but it is evident that we need to try out a greater range of varieties and to study its nutrition more closely.

A limited amount of work was carried out on permanent pastures. At Kitale an experiment was started on improvement of the veld by surface cultivation, application of fertilizers and seeding with good grasses and legumes, but early results do not indicate that this is a promising means of effecting improvement. In the same area trials were started on the eradication and control of bush in pastures by mechanical and chemical means combined with burning. In the African pastoral areas of Machakos District and in the West Suk Reserve three trials on grazing management, and two on bush control, were begun. In the higher altitude European areas Kikuyu grass pastures tend to pass into a stunted and unproductive condition and initial investigations suggest that this is related to lack of aeration and lack of phosphate. Field experiments to carry this investigation a stage further will start in 1953.

Fertilizer experiments were continued to study the effect of nitrogen and phosphate on the growth, composition and nutritive value of newly sown leys, established leys and, to a lesser extent, permanent pastures. The results confirmed the

findings of the previous year, that phosphate generally has a marked beneficial effect on ley establishment and both fertilizers increase yields from established grass. The effect of the fertilizers on the herbage content of crude protein, carbohydrate, lime and carotene was studied.

Coffee

Research work aimed at improving the biological control of the Common Coffee Mealybug (*Planococcus kenyæ* Le Pelley) by introducing and establishing further species of natural enemies from Uganda continued with increased insectary breeding of the new species *Anagyrus* and three species of predatory Coccinellidæ imported in 1951. Field liberations of the *Anagyrus* and one species of Coccinellid have been made in the East Rift coffee areas. To date, no field recoveries have been recorded but experience has shown with previous introductions that a considerable period may elapse before establishment is confirmed.

Experiments were carried out in representative East of Rift coffee districts to study the use of Dieldrin as a means of controlling the mealybug attendant ant *Phiedole puntulata* Mayr. Following these trials, recommendations have been made to growers. Dieldrin bands have been shown to possess greatly improved persistence over chemicals previously used and also exhibit a very marked deterrent action against the ants. A trial to determine whether Dieldrin imparted any undesirable taint to coffee has been carried out, but results are not yet to hand.

In general, the Coffee Mealybug seldom reached outbreak proportions anywhere within its range during the year. Information collected from officers in the African Land Units of the Central Province, where the mealybug was previously a serious pest of food crops as well as coffee, indicates that in these areas biological control has been remarkably successful and that the mealybug has been reduced to the status of a minor pest.

Experimental work with insecticides in coffee has been continued. It is known that excellent control of *Antestia* spp. and Coffee Thrips (*Diarthrothrips coffea* Williams) can be obtained with D.D.T. sprays but on coffee in Kenya, where the biological association is very complex, the persistence of D.D.T. can be a drawback and can cause outbreaks of other species normally controlled by natural enemies. Experiments with D.D.T. dust are in progress to determine whether the insecticide is less persistent in this form. B.H.C. in wettable powder form gave a very good control of *Antestia* but recommendation of this means of control had to be withdrawn because B.H.C. insecticides based on mixed isomers have proved to impart an undesirable flavour, known as "bricky flavour" to the coffee. Further experiments are being undertaken with B.H.C. insecticides based on the gamma isomer. Trials are also being undertaken with a power drift dusting machine in coffee; preliminary results have indicated that this technique is well worthy of further investigation. For Thrips control, the action of the Paris green/molasses/lime spray, introduced by the Department in 1944, was re-examined in a field trial. This spray was found to be only slightly less efficient than D.D.T. at 0.1 per cent in wettable powder form. By its peculiar mode of action the Paris Green spray achieves persistence but appears to be specific to Thrips and does not, therefore, interfere seriously with the natural enemies of the coffee pests. The Coffee Lacewing Bug (*Habrochila placida* Horv.) which had caused serious defoliation of coffee in the Turbo Kipkarren Districts the previous year was studied in the field. The Capsid predator (*Stethoconus* sp.) of *Habrochila* was found to be present in these districts and the field investigations tended to show that D.D.T. spraying to control *Antestia* had led to the serious outbreaks of *Habrochila* by suppressing the Capsid predator.

Investigations into Coffee Berry Disease were continued but a number of lines had to be dropped when the Plant Pathologist employed for these resigned at the end of July. A detailed survey of past work on the disease was published at the

beginning of the year. Some progress has been made in determining the factors which led to an attack of the disease. Further spraying experiments have produced no evidence that the disease can be controlled by this means.

Work on the effect of rates, concentrations, and times of application of coffee sprays on leaf fall continued. The trial of times of spraying and various rates and concentrations of sprays at Solai produced its first crop but, as might have been expected, there was little suggestion of any effects on yield. Leaf fall observations suggested, however, that whereas the May and September sprayings reduced leaf fall in the following leaf fall periods, that in July, occurring when leaf fall was active, actually increased the latter. The experiments comparing the effects of copper and non-copper sprays on leaf fall at the Scott Laboratories were concluded by taking a final crop, but whereas non-copper fungicidal sprays definitely controlled leaf fall, there was no evidence for increased yield from either the copper or the non-copper treatments in this experiment.

The soil science laboratory was extremely short of staff during the year. With effect from 1st January Dr. Pereira took up his new post with E.A.A.F.R.O., a transfer which had been approved some two and a half years previously. An unexpected delay in the arrival of his replacement made it necessary for Dr. Pereira to pay weekly visits to Ruiru to ensure continuity of work in the laboratory. Routine work was successfully continued by the African laboratory staff, and useful progress was made in the soil moisture, structure and meteorological studies outlined in previous Annual Reports. Calibration and field testing of new designs of gypsum, nylon and combined gypsum and nylon soil moisture resistance blocks were carried out, sunflower wilting point determinations were made on further coffee soil profiles, and a study was made of the effect of five years of weed control treatments on the growth of the coffee trees in the cultivation trial by girth measurements on some 2,000 trees.

Tests of standard and modified designs of a tractor-mounted rotary hoe were made on the subject of a detailed tilth study, in which large quantities of cultivated topsoil were sorted into their clod and crumb sizes and the proportion of dust was measured. The results of rotary cultivation of moist weedy soil are sufficiently encouraging to suggest a concentration on development of an improved rotary implement for coffee plantation work, but the tilth analyses amply confirmed the visual evidence of the pulverization caused by the standard implement on only moderately dry coffee soils.

The production of improved planting material by selection of outstanding trees and the testing of both seedling and clonal progenies continues.

Yield recording of individual tree selections continued in two trials at Anmer Estate, Kiambu, on SL 28 trees at the Research Station, Ruiru, on Blue Mountain selections at Kitale and K7 trees at North Kitito Estate, Makuyu.

The number of trials in African areas was extended during the year with additional trials in Meru, Embu, Nyeri, Machakos, North Nyanza and Teita Districts.

Investigations into methods of mulching, with and without the addition of nitrogen, were continued in the mulch trials at Ruiru and Kitale. The second year's results from the manuring trials of elephant grass confirm the earlier indications that further trials are needed to assess the responses obtainable by dressings of manure and fertilizers. The comparative efficiency and persistence of six species of grass when used as a mulch have been studied in a replicated trial. On an acre for acre basis the superiority of elephant grass for mulching coffee has been established.

An interesting comparison has been made between the effects of an elephant grass ley and a grass mulch on soil structural efficiency. Several years ago an area

of old coffee on poor eroded soil was judged to be too poor for improvement and it was decided to uproot three acres per year, plant elephant grass for two or three years, and then replant with coffee. Four blocks were treated in this way but it was subsequently decided to use the remainder of the area for a trial of methods of improving both soil and crop without uprooting the coffee, which included all-row grass mulching for two years. It thus became possible to make a detailed study of the physical conditions of the soil on untreated control plots, on plots which had been mulched for two years, and on crops which represented various stages in simple coffee-grass-coffee rotation. It was found that four or five years under an elephant grass ley had rendered the soil structure fully efficient as regards water percolation but that a very marked deterioration occurred when elephant grass had been followed by two years cultivation. Two years of grass mulching had improved the structural efficiency of the soil to approximately the same extent as the five-year grass ley, had also effected a marked improvement in the coffee, and did not draw on the soil moisture reserves as the grass ley did, thus showing that it is unnecessary to uproot the coffee in order to bring about the required improvement in crop and soil.

A series of tests were undertaken to determine the value of peptic enzymes as a means of hastening fermentation. The doses needed to reduce fermentation time to twelve hours were excessive and probably uneconomic unless the treated coffee showed some improvement in quality; improved quality was not achieved and generally the treatment lowered the quality and value of the coffee.

Pyrethrum

Work was continued with the development of improved strains of pyrethrum suitable for different altitudes and during the year over 1,000 single plant selections were under observation. A number of new crosses were made during the course of the year and 14 variety trials were in progress. Further single plant selections are being made in the seedling progenies from promising crosses.

A new system of breeding similar to that employed with sugarbeet is now in operation in addition to the existing method of producing strains which are crosses between two clones. The new method involves planting a number of isolated plots, each combining several selected clones, and carrying out selection and a degree of inbreeding for several generations within the seedling lines derived from each plot, after which the seedling progenies will be grown together in one seed production plot. This method has only been operated for one year but it is hoped that in due course it will produce strains which are more adaptable, combine more desirable characters and are less liable to sterility troubles than the present strains, and will also possess some degree of hybrid vigour.

Seed production fields of C.47, C.43, C.51 and the mass selected strains "Molo Bulk" and "1970 Control" were maintained but the issue of seed of C.47 is now in abeyance owing to its alleged lack of biological effectiveness, which is still under investigation.

Work on bud disease (caused by the fungus *Ramularia bellunensis*) was continued by the Senior Plant Pathologist of the Department and the Plant Physiologist of E.A.A.F.R.O. The Field Officers conducted experiments at Molo and Ol Joro Orok to test the effects of spraying with Bordeaux or dusting with Perelan with negative results. A trial carried out by the specialist officers, however, showed that, as might be expected, Bordeaux was effective against the disease, but spraying has to be very frequent as otherwise new growth is unprotected. It seems likely that spraying will be uneconomic and that resistant varieties are the only real answer.

Picking/Stripping trials still indicate that the three-weekly stripping, i.e. picking all opened flowers irrespective of stage of maturity, gave higher yields of

pyrethrins per acre than the normal method of selective picking. Mowing, however, resulted in appreciably lower yields of pyrethrins per acre.

Fertilizer trials have shown some responses to phosphates but, with the normal placement of the fertilizer in the planting holes, these are usually confined to the first season except on very phosphate deficient soils. Deeper placement of at any rate part of the fertilizer and during 1952 four phosphate/ridging trials, designed to test the effect of phosphate on the flat and at the base of the ridge, were laid down on phosphate deficient land in various parts of the Colony. A fertilizer placement trial, which, in addition to the above treatments included the placing of phosphate in a subsoil cut 18 in. beneath the surface of the ground, was laid down at Ol Joro Orok.

The chemical section made a study of sampling methods both for export and growers consignments. Recommendations have been put before the Pyrethrum Board. A miniature bale experiment was carried out to test the effect of two baling pressures, two moisture contents and the presence and absence of the socophar preservative on loss of pyrethrins during storage and transit. The higher baling pressure appeared to reduce losses, increasing the moisture content by five per cent was beneficial, and socophar had no effect.

Sisal

During the year work was further expanded by the planting of seven new field experiments. There are now 20 major trials in progress with a total of 943 plots. The new trials deal with the testing of promising hybrids, methods of grading planting material, double- and single-row spacings, the rotation of grass and sisal, mulching and fertilizers.

A further fertilizer trial in the nursery again showed response to sisal waste and sulphate of ammonia. Sisal in the field continued to respond to phosphate, nitrogen, lime and waste and in 1953 experiments will be put down to assess optimum rates of application.

In experiments on types of planting materials, suckers and nursery bulbils of various sizes and also bulbils removed from the pole and planted direct in the field have been compared. The small bulbils off the pole are unlikely to be satisfactory, even if they could be machine planted as they are a year behind nursery plants and give a much less uniform stand. Bulbils from the nursery are the best planting material and there are indications that it would be advantageous to use larger bulbils than those now commonly employed in order to reach the cutting stage earlier.

A series of complex trials are in progress to investigate spacing and cutting under a range of soil and climatic conditions. These trials are still in a rather early stage but the indications are that yields are generally increased by increase in plant population up to about 2,000 per acre and by an early light cut leaving about 30 leaves on the plant.

The planting of grass strips between the rows of sisal and the use of the cut grass to mulch along the rows of plants is being tested in combination with the application of fertilizers and sisal waste. Grass strip and mulching may be expected to be beneficial in checking erosion and maintaining good soil structure but the question to be tested is how far these benefits may be offset by competition for moisture and nutrients.

Pre-emergence spraying with sodium trichloroacetate before planting the sisal has proved effective in controlling couch (*Digitaria scalarium*), which is a serious nuisance, provided the soil is moist when the spray is applied, or becomes so shortly afterwards. Two difficulties in applying this treatment on a commercial scale are the difficulty in timing the application and the present high cost of herbicide.

Sugar

Work on varieties consisted of preliminary observations on the collection of importations at Kisumu, which now contains over 80 varieties, and field trials with the more promising of these importations. The early variety trials have shown conclusively that in the Miwani-Kibos area the variety CO.421 is better than the standard estate variety CO.281, both as regards yield of cane and sucrose content, and the Miwani Estate is now changing over to CO.421. There is some evidence that certain other Coimbatore canes, such as CO.331, CO.213, CO.419, and CO.434, may be better than CO.421; and precise trials to compare all these varieties were put down in 1952. Variety trials of an exploratory nature were continued in African areas where sugar cultivation seems a possibility and the growth of cane in the trial at Kakamega has been excellent.

A spacing and ridging trial at Chemalil, which showed no significant differences on the plant cane crop, is continuing. At both the Coast and in Nyanza long-term factorial fertilizer trials were started in 1952 with nitrogen, phosphate, potash, molasses and filter press mud. Experiments on the use of herbicides for weed control in young canes were also started in both areas.

Horticulture

Horticultural work is carried out at Molo (8,300 ft.) with temperate fruits and vegetables, at Matuga (300 ft.) with tropical and sub-tropical fruits, sub-stations at Ol Joro Orok (7,800 ft.), Kitale (6,000 ft.) and Ruiru (5,500 ft.), and on pineapple plantations in the Thika area and at the Coast.

Observational trials of a number of varieties of apple, pear, plum, peach, apricot, nectarines and almond are in progress at Molo. It has already been possible to make recommendations about plum varieties, but the apple trees are not yet far enough forward for this. Work with almonds is being discontinued as the climate appears to be unsuitable for them. A number of apple rootstocks obtained from East Malling are under preliminary trial. The chilling requirements of all varieties of temperate fruits are being studied and investigations on the use of oil sprays to prevent prolonged dormancy are continuing. Although there was no increase in the mean temperatures for the winter months in 1952, symptoms of prolonged dormancy were more marked than usual and this is believed to be due to the number of hours of sunshine recorded in the winter months.

Strawberries and youngberries are the most important of the soft fruits. The area planted with youngberries at Molo has been very considerably extended in order to obtain reliable yield figures and to provide material for future trials. In strawberry variety trials the varieties Early Cambridge, Auchincruive Climax M.46, Madame Lefevre, Tardive de Leopold and Oberschlesien have been found unsuitable for local conditions; Huxley and Sir Joseph Paxton are still under trial but are not promising; and Cambridge Pine (Cambridge 448) and Cambridge 449, which combine resistance to leaf spot, reasonable yields and good quality, have been successful and are recommended for local planting.

The potential importance of the pineapple industry has led to a considerable expansion of experimental work on this crop both in the higher altitude (5,500 ft.) Thika area and the Coastal area. In fertilizer trials marked responses in vigour of early growth have been obtained from nitrogen and phosphate. Pineapples replanted on the same land in the Thika District have hitherto made extremely poor growth and shown chlorotic leaf symptoms; application of nitrogen had a spectacular effect in improving growth but, even so, it is probably not the complete answer to the problem, and lack of a trace element is suspected. Iron and magnesium had no effect in the field trial this year but leaf analyses suggested that

either copper or an unsuitable iron/manganese ratio may be factors concerned and these will be further investigated in 1953. The quality of pineapples grown at the Coast was found to be greatly improved by growing under shade.

The short day length has been suspected as the cause of poor growth of hops in previous trials. This was confirmed in 1952 by an experiment in which hops given a longer day by artificial illumination grew vigorously while those without extra illumination remained very stunted.

Plant Pathology

During the year two more important economic plant diseases have appeared in Kenya. Panama disease of bananas was found to be distributed sporadically along the whole Coastal Belt and affecting for the most part the sweet eating bananas. In the same area the first outbreaks occurred of a severe maize rust disease caused by the fungus *Puccinia polysora*, which had reached West Africa from Tropical America in 1949. The disease, to which all the local varieties so far tested are susceptible is, so far, confined to the Coast Province. It has, however, appeared in Uganda and will probably attack maize in the Nyanza Province.

Laboratory studies of the Ramularia disease of pyrethrum have continued. A reliable technique for the inoculation of buds and flowers in the laboratory and field has been accomplished. This will enable positive tests for resistance and for experimental work on fungicides to be done under controlled conditions.

One more physiological form of wheat stem rust was identified during the year bringing the total number up to 12. In the field the predominant forms were K.9 and K.11. Eighty-one field collections of rust were received for identification from the Senior Plant Breeder and 52 tests of hybrids and varieties to various physiological forms were done.

Culture of different strains of legume bacteria have been maintained and tested for nitrogen fixation efficiency. Isolations have been made from local herbage legumes. The local strain from Serradella has been much in demand.

Blight immune potatoes originally received from Dr. Black have proved their value in spite of the advent of new physiological forms of blight. A further collection of 12 hybrids of unknown blight reactions have been received from Corstorphine for testing.

Entomology

Work has continued on the control of stored products insects, chiefly the Maize Weevil *Calandra oryzae*. In an experiment to ascertain the effectiveness of various insecticides it was found that gamma BHC at one part per million gave protection for more than 15 months, pyrethrum powder for nine months, and a grain protectant consisting of pyrethrins 0.05 per cent and piperonyl butoxide 0.8 per cent for six months. A large-scale experiment in the experimental cribs using insecticides on cob maize was carried out, and the success by treatment with ten parts per million gamma BHC was striking, almost complete protection being obtained. Assays of the BHC in shelled maize from heavily treated cobs showed that at even a high rate of application the shelled maize did not contain injurious amounts of BHC, and it was therefore possible to recommend up to 12.5 parts per million gamma BHC for use on cobs in the crib. This is a great advance in the protection of maize on the farm.

A heavy infestation of *Schizaphis graminum* occurred on small cereals in August at Njoro and a survey of the surrounding districts showed its presence at Molo, Keringet, Mau Summit, Rongai, Menengai, Solai and Subukia. Field tests carried out at Njoro showed that BHC formulations were satisfactory as sprays while tests elsewhere showed good results with Pestox 101. Large-scale spraying by commercial sprayers was carried out to create aphid-free barriers and several thousand acres were undoubtedly saved through this measure.

A number of recently developed insecticides were tried against the chafer grub of the Trans Nzoia. These experiments were not conclusive and will be repeated. Insecticidal work on control of red scale of citrus, maize stalk borer and other pests was carried out.

Work was begun at the Coast on control of Coreid Bug of coconuts, and also a study of Rhinoceros beetle and other important Coast insect pests.

Biological control projects were—

- (1) the introduction of parasites and predators of *Orthezia*, in which success has not yet been achieved, and
- (2) the introduction of enemies of the *Lantana camara*.

Shipments were made to Mauritius of the maize stalk borer parasite *Apanteles sesamiae* which were successfully bred and liberated there.

Soil and Agriculture Chemistry

Soil phosphate studies were continued with the measurement of early phosphate uptake by maize, barley and rye seedlings from land which had been given heavy dressings of phosphatic fertilizers in October, 1948. The effects as measured in each case by dry weight increase and by phosphate uptake per seedling over parallel no fertilizers treatment were small, the residual effects of Uganda Rock Phosphate being less than those of Sodaphosphate and Double Superphosphate.

In collaboration with the Soil Survey Section E.A.A.F.R.O. descriptions have been prepared of the major soils occurring in several districts in Kenya and a start has been made on the preparation of approximate soil maps for some of these districts. Reconnaissance surveys have been undertaken in various areas which have been proposed for development for African occupation; all areas examined suffered from major disabilities such as lowness of inherent fertility or inadequacy or inaccessibility of water supplies.

Detailed field and laboratory studies have been started as a first step in the investigation of fundamentals of soil fertility maintenance in the Kenya Highlands. This work is being undertaken in collaboration with, and under the inspiration of, an American worker, Professor M. Stelly, who has been seconded to Kenya by arrangement with the Mutual Security Administration.

Numerous assays have been undertaken as part of a survey of phosphate deposits on certain islands off the Coast of Kenya. These deposits have proved to be highly calcareous and to have a very variable, frequently low, phosphate content and few of those yet examined promise to be of commercial importance.

The nitrate and ammonium nitrogen contents of daily rainfall at the Scott Agricultural Laboratories have been subjected to further examination.

Fodder crop studies were continued with the examination of the changes in composition in locally grown Sweet Fodder Lupin with age and with the initiation of a survey into the quality of farm produced silage.

Leaf tissue analyses and leaf injection studies were undertaken as part of an investigation into chlorosis of locally grown pineapples. The only clear evidence adduced was that the nitrogen content of the leaves of healthy plants was markedly higher than that of the leaves of chlorotic plants.

Plant Breeding and Selection

Plant Breeding and the trial of introduced varieties of a number of crop plants is carried out at the Plant Breeding Station, Njoro (7,100 ft.) and at sub-stations at Molo (9,300 ft.), Ol Joro Orok (7,800 ft.) Rongai (6,000 ft.), Kitale (6,000 ft.) and the Scott Agricultural Laboratories (5,700 ft.)

WHEAT

A new physiological form of black stem rust has appeared. This now makes the twelfth stem rust form to be identified in East Africa. Most of the commonly grown wheats including crosses 294 and 318, 360.H, Sabanero and Equator are susceptible to this new rust. A field survey showed K.9 and K.11 to be the dominant forms present during the season both in Kenya and Tanganyika.

Two new wheats were released from Departmental control. One, a selection R64 from the Canadian hard red spring wheat D.C. $\times$ Ceres 721, has proved resistant to the 12 stem rust forms and should therefore afford a valuable addition to the Colony's wheats.

The breeding programme aimed at the production of varieties combining high yield and quality with rust resistance was carried a step further and rust resistant hybrids which had reached the bag stage were promoted to field scale multiplication tests under farming conditions. A large number of new introductions was under test, new crosses and back-crosses were made to build up resistance to K12, and fixed hybrids promoted to the yield and multiplication trials at Njoro, Rongai, Ol Joro Orok and Molo. Samples of all wheats undergoing multiplication were sent for baking tests to the Nairobi Laboratory of the millers Messrs. Unga Ltd.

BARLEY

No hybridization work with barley has so far been carried out and the programme has as its aim the introduction and testing of varieties for suitability to the various altitude ranges and soil types over which the crop is grown. The Scandinavian varieties Abed Kenia and Ymer, which had shown promise in the preliminary trials, are now being bulked up on a field scale for release. Further introductions, including a range of the newer Scandinavian types, were under test. Two barleys, blue barley from Southern Rhodesia and a malting variety from Czechoslovakia, both of which had done well in preliminary trials, were successful on a field scale at Rongai where they were being bulked up.

OATS

The programme of the testing of introductions continued. The crosses of Hajira-Joanette from Minnesota which proved promising in last season's trials were further multiplied.

MAIZE

The work of inbreeding of the various lines continued. Trials of double crosses showed that some of these significantly out-yielded the Plant Breeding Station selections. In addition trials of single and top crosses were carried out in the general programme aimed at choosing the best material for the production of further hybrids. On a field scale an imported hybrid from Southern Rhodesia, S.R. No. 6, under trial at a number of representative areas in the Colony, failed to yield as well as local selections. This bears out previous experience that imported hybrids are unlikely to be successful in Kenya and stresses the need for continuing the present work to produce locally adapted hybrids.

SORGHUM

Work during the season was confined to building up a collection of local varieties and the testing of imported dwarfs chiefly from America.

SUNFLOWERS

Work continued with selection and bulking of the three dwarf varieties Klein, Southern Cross and Mennonite. Sunrise from Canada proved fully dwarf, and bulking of this variety for further tests was undertaken.

PART III—FIELD SERVICES

Progress in Improved Farming

EUROPEAN AREAS

Mr. L. G. Troup, O.B.E., was appointed by H.E. The Governor as Commissioner with the following terms of reference:—

- A.—To inquire into the general economy of farming in the Highlands having regard to capital invested and long and short-term financial commitments, whether secured or unsecured; excluding farming enterprises solely concerned with the production of sisal, wattle, tea and coffee.
- B.—The ascertainment of a fair price to the producer for the 1951 crop of maize and wheat respectively, having regard to the need to ensure that such price shall provide a reasonable profit to the efficient producer, and in the case of maize that its basic importance in the economy of the Colony should not prejudice the ascertainment of a fair price.
- C.—The ascertainment of a basis for the calculation annually of a fair price to the producer for maize, wheat, oats and barley, and such other farm products the prices of which are controlled by the Government having due regard to the need to ensure the maintenance of soil fertility, a balanced and stable agricultural industry and prices which provide a reasonable profit to the efficient producer of any such agricultural product.

The terms of reference are set out here in full because of the stress which the Agricultural Department has laid for many years on the need for balanced mixed farming on an intensified basis in all suitable areas, and the need for equated prices for crop and stock products to encourage such a balance, discouraging monoculture and encouraging stock rearing in a country where production is disbalanced in favour of crops, particularly maize and wheat. Mr. Troup dealt with his Commissions B and C in the early part of 1952, his recommendations about crop price fixation being summarized in the crop section of this Report under maize and wheat. He returned at the end of the year to complete his wider and, in the long term, more important Commission A.

In each of the districts of the Rift Valley Province a pattern of improving husbandry slowly unfolds, slowly because where a change is made from monoculture to alternate husbandry one step only in the developing rotation can be taken each season and each season is of a year's duration. The farmer must gain experience in the establishment and management of grasses where, in the past, he has only been used to planting and harvesting one or two main crops and running a few cattle out at range. Although much work has yet to be done on them there is, in fact, a reasonable range of grasses suitable for most districts and altitudes. Where the farmer wishes to invest in livestock or to improve his livestock, the building up or borrowing of funds for such investment is slow and may be rendered more difficult when there are too many farmers with the same aim seeking too few good stock. In Nakuru District there is a slight tendency for the wheat acreage to decrease in favour of a balanced system of farming and a slow increase of grass leys which are still small in relation to the arable acreage.

Farmers on the whole are tending to grade up their cattle and to utilize exotic breeds where leys are planted. In Uasin Gishu the acreage under grass leys rose from 2,545 acres in 1951 to 6,334 acres in 1952, a step in the right direction but dwarfed by the 32,143 acres planted to maize and 107,375 acres in wheat. In Trans Nzoia seeded grass leys increased by 7,816 acres to 21,340 acres. Continued grass sowing in the next few years should bring it more into balance with the arable acreage of 100,000. Except for work oxen all classes of cattle are showing a steady

increase in these districts, a trend which is being activated by the Rehabilitation Loan Fund. While the area of wheat sown in Laikipia advanced but slightly to 26,170 acres, that in the Naivasha District rose sharply from 65,954 acres in 1951 to 85,487 acres, mainly due to the opening up of yet more land in the Kinangop. Increase in butterfat production in Laikipia is attributed to the larger number of dairy stock carried and more intensive management of stock. In the Kinangop the Soil Conservation Service has been in demand for dividing off large areas of land into suitable sizes for planned farming, such division being of necessity governed by drainage requirements. It is against such a background as this that it is hoped that Mr. Troup will find it possible to recommend practical means for intensifying farming systems for which access to capital and an intensification of investigation and technical advisory staff will be necessary if untutored farmers are to adopt the slow conversion to planned farming with which the more progressive farmers are already being assisted by the technical officers. Without it there will be a gradual decline in production.

In Nyanza Province, after tea, maize is by far the most important crop grown. While farmers are taking an increasing interest in the improvement of grassland and supplementary feeding of stock, nevertheless milk yields were low in 1952, because the production of these valuable feeding aids is still far from adequate. Most farms are understocked from the angle of developing balanced mixed farming but the many cattle being purchased with the aid of Rehabilitation Loans are beginning to correct this lack of balance.

By lending to farmers in the first 28 months of its operation £351,688 out of total loans of £493,447, for the purchase of cattle, the very important contribution which the Agricultural Lands Rehabilitation Fund is making towards balanced farming can be realized.

LOANS APPROVED FROM AGRICULTURAL LANDS REHABILITATION FUND TO
7TH MAY, 1953

DISTRICT	No. of Loans	Build- ings	Water Supplies	Fencing	Cattle	Various	Total
		£	£	£	£	£	£
Uasin Gishu ..	169	13,390	7,677	24,807	139,699	780	186,416
Trans Nzoia ..	82	5,100	6,944	10,285	73,145	1,562	97,035
Nakuru	40	2,405	9,531	3,175	43,835	1,980	60,926
Naivasha	39	7,675	5,309	6,490	32,417	1,564	53,455
Sotik	14	350	3,170	1,300	15,447	460	20,727
Lumbwa/Songhor	15	1,490	1,015	4,910	16,860	125	24,400
Laikipia	19	2,955	6,500	3,760	19,120	3,153	35,488
Machakos	1	—	—	250	750	—	1,000
Nairobi	5	120	1,000	—	3,700	1,684	6,504
Nyeri	5	280	500	—	6,715	—	7,495
TOTAL ..	389	33,765	41,646	55,040	351,688	11,308	493,447

Following the visit of the President of the Royal Agricultural Society of England, Colonel C. B. Cator, to the Royal Agricultural Society of Kenya's Mitchell Park Show in June, the Royal Agricultural Society of England donated two gold medals which, it was decided, should be presented for a farm competition to be competed for by members of the Society. This competition was in two classes, one for farms of 750 acres and over, and the other for farms of under 750 acres. Fair entries were received in each class, and in judging consideration was

given to all aspects of farm development, including lay-out, soil conservation works, economy of building and equipment and profitability.

Seed Certification.—The same procedure covering seed certification was in force as is mentioned in the 1951 Report with the exception that in addition to inspection in the field and subsequent testing of samples in the laboratory, the cleaning of all seed subsequent to field inspection prior to sale through an approved seed-cleaning plant was insisted upon; plans for the handing over of this service to commercial interests are still being considered and it is hoped that thereby there will be established reputable seed firms to deal with agricultural seeds who will be in a position to take over and bulk up through approved growers new varieties of cereals and grass seeds selected and bred by the Department.

ASIAN AREAS

In the Nyanza Province, the main crop grown on the Indian farms at Kibos is sugar cane, the acreage of which was increased and the main problems of which are to overcome alternate excessive waterlogging in the rains followed by droughting in the dry season. For this planting is taking place on cambered beds and small-scale irrigation trials are being undertaken. While maize is grown mainly to feed labour on the Indian farms, this area is not suited to maize growing because of the annual waterlogging that occurs with the main rains in April. A little rice is also grown. Although a few years ago there were several thousand oxen, they have now mostly been replaced by tractors because of rising labour costs.

In the Coast Province plantation crops are those most generally planted by Asians, food production being restricted. Management of some of the coconut plantations has improved and good yields followed the good 1951 rains. Other plantation crops include kapok, mangoes, pawpaws, sisal and sugar. By the end of the year most of the dairies on Mombasa Island had been moved to the mainland. Their production is very much below the requirements of Mombasa and large quantities of milk have to be imported, some from outside the Province.

AFRICAN AREAS

General.—For some years now it has been recognized that the system of African land tenure is the biggest single obstacle to improved farming and to general rural prosperity. The bulk of the African population inhabits the African Highlands or areas in which the rainfall is suitable for balanced mixed farming. With our present knowledge of food crops, grass species, their establishment and management and of suitable cash crops, we can predict that an African family can both adequately maintain itself in food and sell surplus crop and stock products to a value of £100 or more at present day prices from 7—10 acres in the balanced mixed farming zones, the altitude limits of which vary in each Province, but range approximately from 4,500 feet to 7,500 feet above sea level. In each zone there are examples of Africans who are attaining towards this ideal but their numbers are a drop in the ocean of the teeming population. The two main obstacles to achievement of an agricultural revolution are the excessive fragmentation of land which prevents the progressive farmer from developing a balanced holding and the almost complete lack of productive livestock, although such production can be materially improved from existing stock by sound management. The inability to exchange or buy and sell land in order to effect consolidation of economic-sized holdings is inherent in the present system of land tenure. Much of the problem of over-population could be overcome if existing land boundaries in any unit of land could be wiped out and each family re-allocated a single block of land within the same unit equal in area to the sum of its many scattered plots. Inherent suspicion on the part of the African precludes such a solution being achieved on a voluntary basis on a large scale although it might be achieved in

local areas after many years of patient work and a staffing more intense than any envisaged as yet. The planting of permanent cash crops such as tea, coffee, pyrethrum, or sisal as a hedge-row crop, is proceeding along sound and controlled lines but under pressure from political elements in both Kenya and the United Kingdom, so that a patchwork quilt is being built up which will have no relation to the final pattern of consolidated holdings laid out on conservation lines which it is hoped will ultimately emerge, as it is doing in the Kericho District, where the Kipsigis have had the elbow room to enclose holdings of an economic size and, with technical guidance, to hedge in their paddocks and fields on the contour. These views have been presented to the Royal Commission which has been appointed to advise on the problems of the African lands in East Africa and which, it is hoped, will propose acceptable solutions whereby African farming can be developed on an economic and intensive basis such as to absorb much of the surplus population at a higher level of living standards.

Nyanza Province.—The scheme to promote better methods of farming, starting in 1951, provides for the payment from district Agricultural Betterment Funds of rewards for good husbandry to a man whose holding has passed inspection on the three basic points: (1) complete soil conservation works throughout the area, (2) half of the arable land resting under grass, and (3) maintenance of the fertility of the arable land by the use of properly made farmyard manure or compost. The value of the initial award is usually Sh. 250 but the farmer can qualify for additional awards, as the improvement in his farming progresses, for sound rotation of crops, better stock husbandry, culling, tick control, castration of surplus bulls, better grassland management including enclosure and paddocking, and the care of cash crops and trees. Over a few years a farmer can qualify for awards totalling £50 by which time his holding should be sufficiently developed to provide adequate security for a loan from the Agricultural Betterment Fund to meet the cost of still further improvements. Awards take the form of farm tools, materials for building covered cattle yards, wheelbarrows for the transport of manure, ploughs, cultivators, harrows, ox carts at half price, improved bulls, stirrup pumps to spray cattle or labour to clear pasture land of bush and weeds.

A farmer who delivers his maize in 3-ton lots, provided that he has passed inspection on the three basic points and is in possession of a certificate of good husbandry, qualifies for a cash bonus which is, in effect, a refund of half the Agricultural Betterment Fund cess on maize.

MAIZE GROWERS QUALIFYING FOR BONUS: NORTH NYANZA

<i>Year</i>	<i>Number of Growers</i>	<i>Bags on which Bonus Paid</i>	<i>Bonus per Bag Sh. cts.</i>
1949	27	2,078	2 00
1950	38	4,334	2 40
1951	120	8,410	4 00
1952	891	22,661	2 33

There is no doubt that the expenditure of Agricultural Betterment Funds on the "Rewards for Good Husbandry" scheme is effecting an improvement in African farming. The number of registered "improved farmers" in Nyanza Province rose from 1,538 in 1951 to 2,574 in 1952. In the following table are included all forms of rewards including awards, maize bonus and loans from Agricultural Betterment Funds.

REWARDS FOR GOOD HUSBANDRY: NYANZA PROVINCE

District	Recipients		Cash Value	
	1951 No.	1952 No.	1951 £	1952 £
North Nyanza ..	439	1,858	7,869	17,542
Central Nyanza ..	2	20	15	250
South Nyanza ..	35	89	1,126	2,043
Kericho	1,062	607	7,749	4,152
Total ..	1,538	2,574	16,786	23,987

Good progress continued in Kericho District where many hundreds of individual holdings are enclosed and subdivided by neat hedges of *Mauritius Thorn* (*Cæsalpinia sepiaria*). Mixed farming by Africans is more highly developed here than in any other district in Kenya. In the rest of Nyanza Province enclosure is less noticeable although considerable progress has been made in the Kisii Highlands and in the Kitosh country. During the year proposals for the issue of individual Rights of Occupancy for well farmed holdings of economic size were circulated to districts in some of which they were accepted, in others by certain locations only. There the matter rests except that the Departmental Assistant Surveyor in Nyanza Province has begun to train African Instructors for the mapping of holdings and for the farm planning that will be required.

Rift Valley Province.—In a Province whose African areas suffer in general from bad communications, a low density of staffing relative to the area of land and a primitive people, it is hard to discern startling progress in a slow-moving industry such as agriculture. The main arable areas include the whole of Nandi, the medium altitude plateaux of West Suk and Elgeyo and the Kamasia Hills of Baringo. In Nandi the general trend towards enclosure of holdings, economic and uneconomic, has continued and greater knowledge has been secured of the management and economics of such holdings from the 8-acre demonstration holding at Kapsabet where revenue exceeded recurrent expenditure by £55. Both the Administration and the African District Council in Nandi are probably more advanced in their ideas and proposals for the control of land tenure than any other district in Kenya. In Elgeyo, while a number of enclosed holdings are developing in Marichor, the main success which has been achieved has been in regard to the opening up of the African District Council Forest Reserve and its replacement by valuable timber trees and grazing after a period of cropping. In the pastoral areas of Northern Nandi, the Cherengani Mountains and the Leroghi Plateau, grazing control and stock management by Grazing Committees operated satisfactorily and the benefits were appreciated during the drought at the end of the year.

Central Province.—While much progress can be reported from individual facets of improved farming, a combination of all the facets is necessary in the assessment of sound land use and on that basis the sum of the area in Central Province which is even reasonably well used is pitifully small. True it is that the bulk of the land under cultivation, *vide* Table F, is protected by soil conservation measures, that very little manure is wasted nowadays, its use even in Machakos having made great strides in the last five or six years, and that there is an extensive use of compost pits or frames. Furthermore, the most significant advance in the last two years has been the improvement of pasture land by bush and bracken clearing, which made great strides in 1952, and its main significance lies in such districts as Embu and Meru where the stock is normally kept out of the farmlands, thus starving them of manure. In local areas there is a much higher degree of sound land use than is general in the Central Province,

particularly in Iriaini and North Tetu Locations of Nyeri, Chief Magugu's location of Kiambu, the bracken area of Fort Hall and the northern locations of Machakos. The good work recorded on farm planning in these areas continued in the early months of 1952 but came to a standstill when farmers who were progressive or who co-operated with the technical officers of Government were threatened by Mau Mau. That good farmers can make money is shown by two examples from Kiambu. One farmer was found to be earning a gross income of £400 a year off 10 acres from potatoes, maize, beans, peas and the sale of surplus milk and poultry; another receives £2 a week from the sale of carnations and £400 a year from his pyrethrum patch.

Coast Province.—Although progress in improved farming was impeded by drought conditions, more headway was made in the use of manure in both Kwale and Kilifi Districts. In the Teita Hills manure is being more generally applied to vegetables and coffee, the standard of management of which is improving.

Reconditioning, Resettlement and Development Schemes

African Land Utilization and Settlement Board has the function of co-ordinating reconditioning, resettlement and development schemes. For this purpose it administers the funds placed at its disposal by Government. In 1952 Government set aside £200,000 each for the Nyanza and Coast Provinces from the Cotton Sales Funds accumulated in recent years from the sale of cotton from these Provinces. African District Councils themselves finance similar schemes from their own revenues, certain Councils being particularly wealthy in this respect through the substantial Agricultural Betterment Funds which they raise from cesses on maize and other crops and stock produce. Some of the schemes so financed which require the advice or supervision of the Agricultural Department are here described.

NYANZA PROVINCE

Crop cess payments which were collected by Maize and Produce Control for Agricultural Betterment Funds in Nyanza Province totalled £132,003 for the year 1st August, 1951, to 31st July, 1952, all but about £5,000 being derived from maize.

Bunyore Scheme.—Good progress was made with erosion control by grass strips, with the elimination of boundary furrows between holdings, with the preparation of compost, since there is no room for cattle, and its application to the land and with the support of agricultural committees in the very overcrowded areas of South Bunyore and Maragoli locations of North Nyanza.

Manyasi Valley.—An Assistant Agricultural Officer (African) was put in charge of a self-help scheme to rehabilitate this overcrowded valley in Alego location of Central Nyanza by grass strips, gully stopping and the use of manure from cattle bomas.

Lambwe Valley.—Settlement of the Samunyi Valley expanded from 57 to 100 families during the year after an initial setback when it was found that the holdings of 50 acres were too big for the individual to eradicate the remaining tsetse fly. Paid labour was employed to eliminate the worst infestations.

Chepalungu Scheme.—This provides for a settled barrier of cleared land to prevent tsetse fly from encroaching into Kericho District from Masailand. Main work during the year was the improvement of communications and of water supplies, a further eight machine-made dams bringing the total up to 66. The whole of the cleared area of 24 square miles has been settled under simple settlement rules.

Kimulot Scheme.—This scheme covers 7,450 acres and good progress was made during the year in opening up the area with roads, bridges and a market for the settlement of 258 families. Holdings are to be laid out on sound conservation principles.

North Nyanza Mechanical Ploughing Unit.—This unit became fully operative with its six D.2 tractors in December, having worked with a lesser number during the year. The unit is financed by the North Nyanza African District Council from Agricultural Betterment Funds and is expected fully to recover its cost. Ploughing is done for Africans who allow an approved proportion of their land to rest and the unit leaves the land protected by contour grass strips. During the year 1,063 acres of land received a first ploughing, 388 a second ploughing and 747 acres a disc harrowing. Revenue earned totalled Sh. 20,145/75 of which Sh. 1,885 were outstanding at the end of the year.

CENTRAL PROVINCE

Makueni Settlement Scheme.—Settlement at Makueni continued to be popular and was helped by good rains experienced in that part of Machakos District. The number of families settled in 1952 was 405, bringing the total to 850 families, which is well ahead of schedule. Efforts were made during the year to improve the standard of agriculture which was generally poor, requiring greater attention to the resting of cultivated land under sown grass, fodder conservation for the dry season, soil conservation, manuring and planting of cassava as a famine reserve, all so necessary if intensive settlement is to be successfully maintained in this semi-arid area.

Machakos District Reconditioning Scheme.—In respect of the general betterment scheme and the mechanical reconditioning scheme, the year has been largely one of gradual building up, of an experiment in practical methods of operation and of recruitment and training of personnel. Appreciable progress was, however, made. The mechanical unit, despite various difficulties, achieved 2,000 acres of terracing, built two fair sized dams and half completed a third. The survey unit, a necessary adjunct to sound planning of the reconditioning scheme and conservation layout, has done well, its principal difficulty being the shortage of trained personnel. The most important task lies ahead, the application of sound land use to the terraced lands.

There has been a marked change in attitude to communal work in Machakos District and the men have been induced to work practically for the first time in memory. The January terracing figure was 258,219 yards and that in November 986,044 yards and while the January effort was mostly done by women, 85 per cent of the November work was done by men.

Kamba Grazing Areas.—The schemes are being developed on the Yatta, Simba-Emali and the southern areas of Darajani, Kiboko and Makindu by the improvement of water supplies and tsetse eradication to draw off surplus cattle from Machakos. Serious encroachment of fly took place at Simba-Emali and bush clearing by tractor and firewood contractors was undertaken.

Mwea Plains.—A survey of a block of land for irrigation from the Thiba River was begun by the African Land Utilization and Settlement survey team and irrigation trials on black cotton soil in this area were laid down. No progress was made with controlled grazing on the Mwea due to local opposition. At Riakanau the major part of the eroded grazing area, which was closed in 1950 and partially reseeded with grass under scratch ploughing, has recovered to such an extent that it is ready for light controlled grazing.

High-priced Cash Crop Scheme in Nyeri.—With funds from African Land Utilization and Settlement the tea, coffee and pyrethrum schemes continued to be developed although tea and coffee plantings were not being cared for as well as they should, being in areas seriously affected by the Emergency.

COAST PROVINCE

Gede Settlement Scheme.—The number of settlers at the end of the year was 340, a number of absentee plot holders having been replaced by new settlers.

Emphasis was placed on the planting of permanent crops. Better settlers were loaned cattle from the trial herd. Funds were made available from the Cotton Sales Fund to install a pipeline to take fresh water to the Mijomboni settlement.

Shimba Hills.—Efforts continued to be directed towards agricultural investigation as a preliminary to settlement with the very satisfactory result that it was found that good crop yields could be secured with farmyard and phosphate manuring and with tie-ridging cultivation. The trial herd of cattle was maintained in good condition. With this information it was decided that a start could be made with settlement in 1953.

Coast Hinterland Scheme.—The African Land Utilization and Settlement mechanical unit continued to construct or improve dams and roads in the hinterland of the Kilifi and Kwale districts. An area of approximately 340 square miles in the Kwale hinterland was examined and plots for settlement were surveyed in the 2,000-acre block freed from tsetse fly at Vigurungani. It hoped to attract people from the worst eroded and over-stocked locations of Duruma, to which end a branding stock census was successfully started at the end of the year. Settlement rules were passed by the Kwale African District Council.

Indian and Arab Settlement Scheme, Mtwapa.—The Indian and Arab Settlement Board recommended that the settlement scheme should be abandoned but that the land should be reserved for application from Asians under the normal development conditions applicable to Crown Lands.

Soil and Water Conservation

SOIL CONSERVATION ENGINEERS' HEADQUARTERS

Besides being responsible for advisory work on soil conservation in the European and African areas, the Senior Soil Conservation Engineer is directly responsible for his Engineers' Section, for survey, operating and accounting for the three heavy Government mechanical dam construction units, for the Soil Conservation workshop organization, the Levellers' School, for the aerial survey programme and for farm and field drainage. The variety of his advisory work can be indicated by summarizing the problems to which he gave attention in 1952. Regular visits were paid to the Machakos Reconditioning Scheme to plan surveys and layouts to meet the requirements of conservation planning of holdings, mechanical soil conservation operations, cut-off drains and drainage ways, communications, cattle tracks, water supplies, dam construction, etc., to allow for future development of good land husbandry practices and rotations. At Makueni he checked the work in the settlement scheme on the survey and topographical layout of holdings. In Fort Hall he advised on the disposal of run-off water, the use of grassed drainage ways and bench terracing and in the Kaimosi Reserve he advised on the prevention of silting of water storage tanks. In the Broderick Falls, Kimilili and Bungoma areas of North Nyanza he studied the effectiveness of grass strips and the need for grassing drainage lines. Work on dam construction and drainage is dealt with in a later section of this Report.

Buildings.—The Public Works Department completed the European and African quarters all but one Class IV house and the offices for the new Engineers' headquarters at Nakuru. The main workshops at Nakuru and quarters for African labour were completed while alterations were made to the Kitale Workshop and Levellers' School including the building of a Type III house for the Leveller-in-Charge.

Workshops.—The main Nakuru workshops came into full operation at the end of the year while the Kitale workshops undertook major repairs and overhauls on behalf of the Trans Nzoia and the Uasin Gishu Soil Conservation Units, the Agricultural Department and the Grassland Research Station, Kitale.

Levellers' School.—This was opened towards the end of the year. A trade test given for Levellers due for promotion showed that they required a much more broad and thorough training. A short survey course was given to Assistant Soil Conservation Officers. Further courses for Levellers had to be deferred as Emergency Regulations forbade the movement of Kikuyu staff from one district to another.

Aerial Survey.—At the beginning of the year there were 50,366 acres of ground control outstanding for the 1950 and 1951 aerial survey programmes, all of which was completed during the year. A resurvey of 10,486 acres had also to be done.

SOIL CONSERVATION—EUROPEAN AREAS

Terracing.—A number of favourable factors enabled the six mechanical terracing units of the Soil Conservation Service of the Department to protect 27,189 acres against erosion, some 6,548 acres more than in 1950, the previous best year. The first factor was the dry season which enabled units to work uninterrupted except for a short break caused by the April–May rains. A second was the equipment of all units with the full number of tractors required for efficient operation. The new sub-unit established on the Kinangop fully justified itself and was much in demand. A third factor was the operation of some units right through the slack season from July to October by finding alternative work. Nevertheless, out of a total possible operating time of 62,078 tractor hours, some 28,745 were lost due to rain and standing crops, breakdowns or delays in workshops, lack of spares and, at the end of the year, due to the declaration of a state of emergency and the failure of the short rains whereby the hard ground rendered it difficult for terracers to operate. A number of officers were called up full time to the Kenya Regiment and the remainder were enrolled part-time in the Kenya Police Reserve. In so far as possible these adverse factors are being overcome by equipping soil conservation units with machinery to construct small dams out of season or as part of operations on planned farms and by the improvement of workshop facilities and stocks of spare parts. While “fast moving” spares are generally obtainable from the local agents for the various makes of tractors and equipment, not infrequently the lack of a small or large part requiring importation from the manufacturers has kept a tractor out of action for several weeks or even months at the season of its highest earning capacity.

ACREAGES PROTECTED BY SOIL CONSERVATION MEASURES

DISTRICT	1941–9	1950	1951	1952	TOTAL
Trans Nzoia	19,060	4,679	4,035	6,455	34,229
Uasin Gishu	9,359	6,187	5,354	5,366	26,266
Nakuru	26,693	4,758	5,523	5,624	42,598
Thomson's Falls ..	3,431	3,281	2,287	8,246	17,245
Nyanza	2,821	1,083	1,190	1,080	6,174
Nairobi	736	653	1,174	418	2,981
TOTAL ..	62,100	20,641	19,563	27,189	129,493

A feature of the work in Uasin Gishu has been the success of the Assistant Soil Conservation Officer/Inspector in getting selected farmers to build their own terraces as part of their ploughing operations under supervision. Approximately 1,000 acres on seven farms were protected this way.

Permanent Crops.—The work in Nairobi District cannot be judged solely by terrace construction because much of the land is occupied by the permanent coffee, sisal and pineapple crops, for which valuable demonstrations have been given by

the Assistant Soil Conservation Officer in conjunction with the Coffee and Sisal Research Stations on contour planning, mulching and bench terracing for coffee, on graded railway layouts for sisal and on the opening up of new lands by drainage. In 1952, 571 acres of sisal were planted on the contour. Other soil conservation works undertaken in permanent crops were the terracing of 560 acres of land for tea growing in Nyanza, bringing the area so protected to 2,216 acres. For the developing wattle industry in Sotik 157 acres were terraced, while in Uasin Gishu a further 350 acres were protected with diversion ditches for contour planting of New Zealand Flax, bringing the total area so protected to 999 acres.

Farm Planning.—Farm surveys and planning expanded steadily in Nakuru, Thomson's Falls, Uasin Gishu and Trans Nzoia despite shortage of survey equipment and trained staff. In several districts farmers who had received their maps from the aerial survey programmes have pressed to have their farm layouts and programmes planned completely for them. This alone would involve several years' work for the departmental district teams of agricultural and soil conservation officers. In the succeeding table on farm planning farms planned are those for which a complete agricultural plan has been drawn up, including arable-ley rotations, cropping, stocking, stockfeed and use of by-products and the economic and capital development of the farm. The significant figure in the table is the 9,302 acres planned rather than the 31,967 acres surveyed but still awaiting planning and the implementation of such plan. There is the world of difference between a farm plan and a planned farm which was well brought out in the departmental exhibit at the West of Kenya Show held at Eldoret in October. The value of stock products from this planned farm was somewhat greater than the value of crop production whereas in the West of Kenya generally the disbalance in the value of crop production is several-fold greater than stock products.

FARM PLANNING

DISTRICT	Farms Surveyed and Mapped		Farms Planned	
	No.	Acres	No.	Acres
Nakuru	10	5,230	9	5,682
Thomson's Falls	4	5,838	1	638
Kinangop	13	3,622	—	—
Uasin Gishu	2	5,138	1	1,982
Trans Nzoia	12	9,650	—	—
Nairobi	5	2,579	1	1,000
TOTAL	46	31,967	12	9,302

Soil Conservation Finance.—With the Colony's development and reconstruction schemes planned only to the end of 1955, the future of the Soil Conservation Scheme for both European and African areas, costing some £282,000 a year, was given consideration. Government agreed to absorb the scheme in to the Colony budget year by year for the next four years, beginning in 1953. It is also agreed policy that cost of the Engineers' headquarters, all the staff in African areas and the Advisory Services in European areas should be fully met by Government. Of the annual cost of the Operational Services, European areas, of £79,000, half would be met by Government and half, as heretofore, would be recovered by charges to farmers. Charges to farmers for soil conservation works remained unaltered during the year and charges invoiced to farmers on 267 accounts in 1952 totalled £53,960 compared with £33,802 in 1951. Despite the facilities provided by the Land and Water Preservation Ordinance for Land Bank Loans on easy terms, such loans are hard to come by and it is hoped that the terms of the Agricultural Lands

Rehabilitation Fund will be widened to include soil conservation works. While the procedure for the recovery of debts from farmers was tightened up, of £52,061 outstanding at the end of 1952, £15,031 was in respect of the years 1947-51.

Land and Water Preservation Ordinance.—The Director of Agriculture issued 136 Orders under the Land and Water Preservation Rules in 1952 of which 83 required protection of land by terracing, 20 the closure of drainage ways and 33 closure of river banks on steep slopes to cultivation. Each European district has an Assistant Soil Conservation Officer/Inspector whose duty it is to inspect farms, draw the attention of farmers to the infringement of the Rules, to erosion, to correct methods of ploughing and maintaining terrace systems and to supervise squatter cultivations and river scouts. Acreage of squatter cultivation laid out for soil conservation measures in 1952 were 1,200 in Uasin Gishu, 3,898 in Nyanza and 3,191 in Nairobi District.

SOIL CONSERVATION—AFRICAN AREAS

Nyanza Province.—Soil conservation measures are most advanced in the Kericho District and the Kisii Highlands of South Nyanza District. In Kericho the good rainfall maintains good growth on the contour grass strips which are augmented by trash, leading in time to a benching effect, while the wide adoption of contour hedges enclosing paddocks, fields and holdings (*Mauritius Thorn* in the wetter areas and *Euphorbia* spp. in the drier) provide effective wash stops. In the Kisii Highlands soil conservation by means of trash lines practised since 1946 proved so successful that this method has been retained, the trash lines being built up with weeds until they become solid grassed ridges.

In the drier areas the replacement of the unpopular narrow-base terracing and communal responsibility by grass filter strips and individual responsibility was complete in 1952. In areas of medium rainfall the edges of strips are defined by marker plants, Napier grass, sugar cane or thatching grasses. In areas of low rainfall, as the grass filter strips are not immediately effective at the commencement of the rains, the lower edge of the strip is close planted with an indigenous hedge plant such as *Euphorbia tirucalli* to stop the wash. While maintenance of grass strips involves the African farmer in the minimum amount of work, they can only be considered effective on easy slopes provided the length of slope is limited. Long slopes must be divided by cut-off drains to lead surplus run-off to grassed drainage ways. The maintenance of grassed drainage ways and the disposal of storm water is not yet fully appreciated in Nyanza Province. While in South Nyanza and Kericho it is estimated that 85 per cent protection is afforded to the cultivated land in the low country and 100 per cent in the high, the effectiveness of soil conservation in Central and North Nyanza is at present only placed at 10 per cent.

Central Province.—Progress on land rehabilitation had been on a record scale until October when worsening passive resistance amongst the Kikuyu tribe led to the declaration of the State of Emergency. Although in Nyeri and Kiambu agricultural work was brought to a virtual standstill, in Nyeri the amount of narrow base and bench terracing completed was the highest recorded yet. The advantage taken of the Emergency by the Administration in the Fort Hall District to step up the output of communal works such as bush and bracken clearing deserves the highest praise. While the political situation was not so bad in Embu, the efforts of the European agricultural staff were largely dissipated on emergency police duties for lack of regular police in the district. In Meru such dislocation of work as occurred was brought more or less under control by the end of the year. In the Ukamba districts of Machakos and Kitui there was a general attitude of co-operation and a most satisfactory feature in Machakos is that 85 per cent of the communal work is now done by the men, whereas a year or two back it was virtually left to the women.

TABLE E.—SOIL CONSERVATION SERVICE—EUROPEAN AREAS
Output of Terracing for Year 1952

DISTRICT	No. of Farms Treated by Tractor	ACREAGE PROTECTED BY				COMPLEMENTARY WORKS			
		Broad Base and V Terraces	Diversion Ditches (a)	Narrow Base Terraces	Bench Terraces	Total	Roads	Excava- tion (b)	Terrac- ing Banks
							Yards	Cubic ft.	Yards
Trans Nzoia ..	32	5,212	1,220	—	23	6,455	87,452	906,453	116
Uasin Gishu ..	56	3,990	1,376	—	—	5,366	62,086	4,800	1,933
Nakuru ..	56	2,598	2,840	164	22	5,624	106,550	—	68,146
Thomson's Falls ..	52	1,860	6,386	—	—	8,246	51,531	518,696	33,141
Lumbwa ..	24	889	157	34	—	1,080	26,992	195,938	9,761
Nairobi ..	7	317	—	77	24	418	25,196	22,849	372
TOTAL ..	227	14,866	11,979	275	69	27,189	359,807	1,648,736	113,469
									44,096
									176,861

(a) Diversion ditches or cut-off drains used as sole protection on slopes up to 4% on planned farms but not as part of a terracing system.
(b) Completion of terracing, finishing off high and low spots and levelling anti-hills by farmers or Soil Conservation Service labour or machines (bulldozer, traxcavator or scraper).

Narrow Base Terracing.—In the prevailing political situation the increase in narrow base terracing from 19,016 miles in 1951 to 21,017 miles in 1952 must be regarded as satisfactory, particularly if the further increases over 1951 in bench terracing and bush and bracken clearing are taken into account, *vide* Table "F". In Nyeri District those Kikuyu who planted crops on unterraced land became liable to prosecution. Machakos District achieved a large increase in the amount and quality of work done while in the Ndia and Gichugu divisions of Embu it has become difficult to find considerable areas of unterraced land and effort is concentrated on closing the gaps. In Fort Hall, Kiambu and Kitui there was a decrease in the area of land protected during the year, in Kitui the communal effort being largely employed on dam making. Work on renovation of terraces continued at a high level and has been eased to a certain extent by the planting of live wash stops such as *Coleus* and *Commelina*.

Bench Terracing.—There was a notable advance in the area of bench terraces constructed during the year with increased appreciation by the people of their advantages, the quantity of work completed rising from 304 miles in 1951 to 1,351 miles in 1952. In Embu District large areas of narrow base terracing are being done on the "*fanya* new method" system whereby the terrace bank is thrown above and not below the terrace channel. This will in time build up into the bench terraces. Bench terracing was not held up at all by the Emergency in the Nyeri District whilst spectacular progress was made in Meru and in the Kagundo, Matungulu and Mbooni locations of Machakos. The desirable practice of heavily manuring bench terraces continued to operate. There is great unfulfilled scope in Kiambu with its market gardens and pineapple industry for bench terracing.

Mechanical Terracing.—As part of the Machakos Reconditioning Scheme, financed by African Land Utilization and Settlement and run by the Agricultural Department, a pilot area of 1,200 acres was terraced and two dams constructed at Kimutwa by the two D.6 tractors of the mechanical unit as a stimulus to communal and individual effort. Valuable experience was gained. In the next area of Tulimani in Mbooni location, the people have accepted the principle of complete survey of individual boundaries. Each area is surveyed and the layout planned on topographical lines under the guidance of the Senior Soil Conservation Engineer. The success of these conservation areas, however, depends on the success of the follow-up in which the Wakamba will have to be induced to accept widespread changes in their methods of land use.

Bush Clearing, Reclamation and Grass Planting.—Bush and bracken clearing made a great advance, 42,603 acres being cleared compared with 23,320 acres in 1951. Impressive areas have been cleared in Meru, Nyeri and Embu but particularly in Fort Hall where the whole appearance of the countryside is being changed as large areas of bracken are replaced by pasture. When first cleared the land carries a poor herbage such as couch. Although this is some improvement, a much greater improvement can be effected by cultivation and inter-planting a superior grass crop. A start has been made in Embu and Meru. In Kiambu a large number of pamphlets on bracken clearing which were distributed at a meeting in December were all collected and burned although the pastures are worse infested with useless weeds than in any other Kikuyu district.

The year generally was an unsatisfactory one for grass planting because of the scanty rains, there being little to show for the large amount of work done. Scratch ploughing and seeding of large areas in Machakos, Kitui and Meru with local grasses gave disappointing results. Grass planting in areas of better rainfall was not extensive, most of the backlog of work having already been done. Because of lack of rain there will have to be a big programme of grass planting in constructed drainage ways in 1953.

TABLE F.—SOIL CONSERVATION FIGURES FOR 1952—CENTRAL PROVINCE

DISTRICT		Narrow Base Terracing Acres	Bench Terracing Acres	Acres Manured	Cattle Sheds In Use	Compost Stacks or Pits in Use	Grass Planted Acres	No. of Trees Planted	Bush Clearing Acres
Meru	..	3,591	862	9,346	800	14,998	13,100	77,392	9,976
Embu	..	20,405	2,700	(i)	(i)	(i)	288	4,281	5,473
Nyeri	..	13,570	668	(i)	14,251	12,653	815	200,220	7,986
Fort Hall	..	12,593	72	(i)	12,201	9,141	(i)	(i)	18,818
Kiambu	..	7,897	8	(i)	1,707	(i)	11,409	(i)	—
Machakos	..	11,694	17	6,045	(i)	(i)	5,399	(i)	—
Kitui	..	1,737	38	(i)	—	—	1,296	(i)	350
1952	..	71,487	4,375	15,391	28,959	36,792	32,307	281,893	42,603
1951	..	69,061	590	(i)	12,501	28,053	42,491	1,312,902	23,320
1950	..	80,765	(i)	(i)	(i)	33,547	11,649	(i)	(i)

(i) Figures not known.

Grazing control on communal lands is essential for land reclamation, particularly in areas such as the Machakos Reconditioning Scheme. Although an impressive amount of work has been done on reclamation of the "mangalata" or bad lands, only lip service is paid by the people to the necessity for grazing control. In Machakos and Kitui every third contour is planted with sisal with the object of producing stock proof fences to effect grazing control in years to come. The grazing scheme devised in 1948 for the Mwea Plains of the Embu District has not yet been applied. A survey was done in 1952 of the Ndeiya area of Kiambu to determine water requirements and the possibility of grazing control.

Coast Province.—The use of African conservation teams concentrating on focal areas has resulted in better general control of anti-erosion work, more frequent inspections and a greatly increased area being covered by a more substantial type of trash line correctly pegged and spaced. Due to adverse climatic conditions the survival of planted live wash stops was but 50 per cent.

SOIL CONSERVATION—COAST PROVINCE

		<i>Bench Terraces</i>	<i>Acreage Protected by Trash Lines</i>	<i>No. of People Applying Manure</i>
Voi		51	1,433	(i)
Kilifi		—	2,382	135
Malindi		—	942	—
Kwale		—	2,349	264
		—	—	—
Total		51	7,106	399
		—	—	—

An increasing amount of land is being terraced for coffee and vegetables in the Teita Hills where the annual programme of gully stopping was continued along the eroded foot slopes. For lack of long rains, nowhere was grass planting successful but during the latter half of the year small areas were planted during occasional storms. Similarly, only a small proportion of the trees planted during the year survived.

Rift Valley Province.—Terracing was limited to areas which could be supervised closely, the majority of effort being directed towards grass strips which are proving to be more effective than badly constructed and badly maintained terraces. Statistics of the amount of terracing and grass strips are not available but solid progress has been made. Maintenance of grass strips, too, has its problems. As the Assistant Agricultural Officer, Kapsabet, reports of Nandi District, "the difficulty at present is to keep the minimum width of these strips up to 6 ft. and a drive has been started by Chiefs, headmen and agricultural staff to punish offenders through the local tribunals. Thanks are due in no small measure to the Administration for their backing and interest in this connexion".

Grass planting is very much in the demonstration stage in all areas although a little progress is reported from both Elgeyo and Baringo. In areas with mixed farming possibilities this is very much bound up with the evolution of small holdings where an individual can reap the reward of his own labours. In all districts rotational grazing systems, in which resting periods are allocated to specific areas each year, are being encouraged. Unfortunately this policy had to be temporarily abandoned in Elgeyo at the end of the year due to the extreme lack of grazing in the unclosed areas, giving definite evidence that de-stocking is one essential in the implementation of such a policy.

WATER CONSERVATION—MECHANICAL DAM CONSTRUCTION UNITS

The Engineers' Section is responsible not only for the surveys, plans and specifications for the Government's Nos. 1, 2 and 3 Dam Construction Units but for the work of contractors in the Nyanza Province hired by African District Councils and for advising on the smaller type of dam constructed by units of the Soil Conservation Service. The Dam Construction Units operate to a programme approved up to two or more years ahead by the Colony Water Resources Authority. When a unit is advertised as being available to operate in the catchment area of a particular Regional Water Board, the dam sites of large numbers of applicants have to be inspected by the Soil Conservation Engineers or Assistant Surveyors. At the latter end only about one-quarter of the original dams applied for are constructed because sites may be found unsuitable or so small as to be only suited to construction by a Soil Conservation Service Unit or because the estimated cost of the dam is beyond the means of the farmer in European areas. In the construction programme in the South Nyanza District, of 160 sites inspected by the Soil Conservation Engineer, 65 were found to be suitable for construction by No. 2 Dam Construction Unit, 50 to be suitable for hand or ox-draft construction and the remainder to be uneconomical. This means that the Engineers must be many months ahead of construction programmes with their inspections and surveys if plans and specifications of the final takers are to be ready for the arrival of the Unit on the scene of operations. While in the European Areas application lists are closed a month or two before the Dam Construction Unit is due to arrive, invariably after the Unit has been seen in operation in the district, numbers of new and pressing applications are submitted. The introduction of a £500 minimum for the heavy units and the equipping of Soil Conservation Service Units to construct smaller dams has eased the work of the Engineers somewhat.

Since their inception, out of a total of 177 dams constructed, the three heavy mechanical dam construction units have built 133 dams in European areas and 44 in African areas, the latter figure not including the large number of dams made by contractors, by African Land Utilization and Settlement or by communal effort. With two units now operating in African areas, the proportion will be redressed.

No. 1 Dam Construction Unit started the year at Makueni in Machakos by constructing a large dam at Kilili having 70,000 cubic yards fill and later moved to construct dams at Thika, Ruiru and Kinangop, taking over where No. 2 Dam Construction Unit left off. The latter unit started the season in the Uaso Nyiro catchment at Ol Joro Orok, moved to the Rift Valley catchment by way of Ol Kalou, Wanjohi Valley and Kinangop and finally in August moved to South Nyanza, where conditions were rendered difficult and expensive because of the distance from rail head. The North Nyanza Dam Construction Unit was pulled out of North Nyanza in May because of bad weather conditions and for overhaul prior to undertaking work in Trans Nzoia. Again, because of bad weather conditions, it had an unhappy experience in its efforts to dam the Kwoitobos River at Karara before it was pulled out for complete re-equipment as No. 3 Dam Construction Unit, financed by the Nyanza Province Cotton Sales Fund and operated by the Agricultural Department. Contracts supervised during the year included nine dams and waterholes built by Tayor Woodrow, Ltd., in Central Nyanza while Temoyetta, Ltd., built seven dams in South Nyanza as part of the larger programme on which No. 2 Dam Construction Unit was employed, having earlier in the year completed 12 dams in the Kericho District under the supervision of the Agricultural Officer (African Areas) and the technical guidance of the Soil Conservation Engineer. The water storage capacity created by all this work totalled 665,240,000 gallons compared with 397,000,000 gallons in 1951. Details of the work done are given in tabular form. The cost per cubic yard of fill covers all charges, delays and moves from one catchment area to another in respect of Government Dam Construction Units.

DAM CONSTRUCTION—1952

UNIT	No. of Dams	Earth Moved	Water Storage	Cost per cu. yd.	Tractor hours Worked	Mean Output per Tractor
		<i>Cu. yds.</i>	<i>Mil. gal.</i>	<i>Sh.</i>		<i>Cu. yds.</i>
No. 1 D.C.U. ..	11	265,211	337.4	1/55	5,954	44.7
No. 2 D.C.U. ..	31	298,509	159.3	1/32	4,693	63.6
N.N. D.C.U. ..	3	48,300	10.0	6/06	2,100	23.0
Uasin Gishu, S.C.S.	10	65,453	72.0	1/71	1,480	45.0
Thomson's Falls S.C.S. ..	1	3,000	—	—	38	—
Central Nyanza Contract ..	9	60,000	40.0	—	2,000	30.0
South Nyanza Contract ..	7	89,560	46.5	—	3,421	26.2
TOTAL ..	72	830,033	665.2	—	19,686	46.9

Dam Construction Finance.—In March, 1952, the charge for dam construction was raised from Sh. 45 per tractor hour to Sh. 70 and in June the minimum limit for dams to be built by Nos. 1 and 2 Dam Construction Units was raised by the Water Resources Authority from £300 to £500. The increase in charges was made necessary by the substantial rise in costs of machinery, spares, fuels and lubricants and cost of living allowances since the lower charge was first fixed which has, after full provision for survey, operation, depreciation and accounting, resulted in a net debit balance of £10,000 between 1948 and 1952. In 1952 these two units earned £37,986 as against £27,750 in 1951. Accounts outstanding at the end of 1952 totalled £53,435 of which £21,422 related to the years 1948 to 1951 inclusive, a sum to which the Dam Construction Section, running on a self-reimbursing account, can ill afford to lack access.

WATER SUPPLIES—AFRICAN AREAS

Nyanza Province.—A total of 51 dams and large waterholes were built in Nyanza Province in 1952, 30 of them made by mechanical dam construction units as already related. The South Nyanza African District Council has voted £50,000 for the network of dams in the Southern Division where the present trek of the large cattle population to Lake Victoria for water is the cause of serious soil erosion. Of this sum £40,000 was made available from the surplus balance of the District's Agricultural Betterment Fund and £10,000 from the Nyanza Cotton Sales Fund. In the Chepalungu area of Kericho the total of tractor-built dams has now reached 40. After completion of dams, much work falls on Assistant Agricultural Officers in providing the necessary safeguards, grass planting on walls and spillways, planting stock-proof perimeter hedges, protecting catchment areas, stoning approaches and installing stand pipes for human use and watering troughs for stock.

DAMS AND LARGE WATERHOLES CONSTRUCTED—NYANZA PROVINCE

	<i>Before 1951</i>	<i>1951</i>	<i>1952</i>	<i>Total</i>
North Nyanza ..	13	9	10	32
Central Nyanza ..	11	17	10	38
Kericho ..	98	6	11	115
South Nyanza ..	5	4	20	29
Total ..	127	36	51	214

Central Province.—The main dam construction effort has been concentrated in Ukamba. In Kitui the good record of hand-constructed dams was maintained, the 43 made in 1952 bringing the total to date to 232. Of the nine dams constructed in Machakos, three were built by No. 1 Dam Construction Unit, two by the mechanical reconditioning unit and four by ox-teams. Elsewhere in the Province few dams were made; the Nyeri African District Council D.4 tractor only completed two before it broke down.

Coast Province.—The African Land Utilization and Settlement mechanical unit of the Coast Hinterland Scheme worked in Kilifi until June, thereafter moving to the Kwale hinterland and was employed on building dams and road making. There are now over 70 small earth dams in Kwale District. Much of the work in the Coastal strip involves improvements to wells. In the Voi District pipe water supplies were laid from three springs in the Teita Hills to reduce erosion on hillsides.

Rift Valley Province.—Five dams were constructed during the year, one in Elgeyo by the Uasin Gishu Soil Conservation Service Unit, and a number of springs tapped to provide water points to prevent tracking by cattle.

FIELD DRAINAGE

Observations and trials on field drainage were continued by the Senior Soil Conservation Engineer and the Assistant Soil Conservation Officers in charge of Thomson's Falls, Kinangop and Nyanza Units of the Soil Conservation Service which serve huge areas of badly drained land. The Senior Soil Conservation Engineer reports that ridge and furrow ploughing appears at this stage to be the most practical method of field drainage for crops and can generally be carried out by the farmer's own implements except where large areas require diversion ditches to take the discharge of the furrows whose fall in general must not exceed one per cent if erosion is to be avoided. In a comparatively dry year broad 48 ft. ridges gave better yields than narrower ridges. Combined with this work, trials are required to determine the best cultivation methods to increase the depth of penetration of water in these areas where the surface soils above the impervious clay layer dry out quickly. There are indications that surface drainage by shallow open ditches will give improvement to pastures on water-logged ground. Mole draining has but limited application except in limited areas of clay because murrum pans break their continuity. Much of the conversation work on the Kinangop has comprised contour drains in the shape of a large terrace set out with one-half per cent fall at approximately 600 ft. intervals down slopes designed to intercept surface drainage in heavy storms and to enable farmers later to work in ridge and furrow. Inspection of old terracing in the Lumbwa-Songhor area put in on drainage grades has indicated the importance of keeping a "V" section to the channels and of keeping the channels free from weeds if they are to serve their purpose as drains and not in fact to impede drainage. On one farm in Lumbwa it was found necessary to combine 12 ft. into 24 ft. ridges for ease of working while the maximum safe length of ridge appeared to be from 600 to 900 feet, beyond which erosion was evident. It is hoped to lay down trials in the badly drained Sotik "parkland" area. A Cuthbertson drainage plough was on order but had not arrived by the end of the year.

Drainage lines were surveyed and mapped in the Bahati area of Nakuru District covering 12,000 acres on 20 farms, work being held up from October because the A.S.C.O. concerned was called up to the Kenya Regiment. A flaw in the legislation requiring the protection of drainage ways from cultivation was discovered through the loss of a court case and had to be amended, necessitating the re-issue of all orders placed previously on farmers requiring them to protect their drainage ways.

Meetings of farmers' associations in the North and South Kinangop passed resolutions requesting the Director of Agriculture to survey and demarcate natural drainage lines in the area, themselves undertaking to accept drainage waters from neighbouring farms.

Agricultural Education

EGERTON COLLEGE OF AGRICULTURE

Fifty-four students took up residence at the beginning of the year. Of these thirteen secured their diploma in agriculture at the end of the two-year course, while two out of seventeen failed to satisfy the examiners at the end of the first year. Of the twenty-three students on the one-year Certificate Course, eleven were awarded their certificates while another eleven took up employment before completing the course. Three students were called up to the Kenya Regiment before taking their examinations. It was necessary to cancel the annual farmers' short course in November because of the Emergency but 29 Assistant Agricultural Officers and Livestock Officers were given a month's course covering all aspects of sound land use.

While the Tatton Farm is now run on a self-accounting basis, proposals were put to Government during the year whereby the Egerton College of Agriculture should become a self-governing institution.

AFRICAN AREAS

Training of Agricultural Instructors.—The training courses for Agricultural Instructors continued at the three Provincial Training Centres, at Siriba in Nyanza, where a combined course is run for teachers, veterinary and medical staff by the Education Department with the assistance of an Assistant Agricultural Officer and four Agricultural Instructors, at Embu for Central Province Instructors which is run by an Agricultural Officer, an Assistant Agricultural Officer and two teachers and at Matuga for the Coast Province with inadequate supervisory staff until a Makerere-trained African Assistant Agricultural Officer took over in September. At all the schools a two-year course is run for Instructors with the Kenya African Preliminary Examination pass and at Embu a one-year certificate course was run for tribes whose educational development is backward. Each of the training centres is developing a series of small farm demonstrating systems suited to the areas from which trainees are drawn.

PROVINCE	Two Year Course		One Year Certificate Course	Total
	1st Year	2nd Year		
Nyanza	20	21	—	41
Central	28	20	14	62
Coast	15	8	—	23
TOTAL	63	49	14	126
FAILED	14	12	1	27
TOTAL PASSED ..	49	37	13	99

Combined agricultural refresher courses were held in the Meru, Embu, Nyeri, Fort Hall, Kiambu and Kitui Districts for 33 Chiefs, 167 Teachers, 8 Veterinary Instructors, 25 Agricultural Instructors, 8 Farmers and 2 Community Development Assistants.

Bukura Farm Institute.—Eighteen out of the 20 African families completed the one-year course in better farming methods. The average net profit per holding on the year's working was Sh. 735 compared with Sh. 496/80 in 1951. When these holdings, averaging 8.27 acres, grow sown grass leys in the fallow break, become self-contained for stock and grow a high-priced cash crop, their potential productivity will become more apparent. On their return to their own farms in the Reserves, the trained farmers are visited and assisted by the district agricultural staff. Reports on the progress of those farmers who have completed this course since 1949 have been satisfactory and many of them have qualified for awards and assistance from district Agricultural Betterment Funds.

The success of the Bukura Farm Institute has resulted in provision being made for the establishment of similar institutes in the other districts of Nyanza Province, each African District Council having undertaken to meet the recurrent cost and in Kericho the capital as well. £15,000 has been voted from the Cotton Sales Fund for capital expenditure in Central and South Nyanza. By the end of the year construction of the institute at Kisii was half completed while at Kabianga in Kericho the site had been cleared of bush.

At Bukura an African Assistant Agricultural Officer was occupied full-time throughout the year in conducting 18 refresher courses of from one to six weeks' duration, including instruction on mixed farming and soil conservation for Agricultural Instructors, on school gardens and district agricultural problems for teachers and on homecraft and their part in running an improved holding for women.

	<i>Courses</i>	<i>Students</i>
	<i>No.</i>	<i>No.</i>
Agricultural Instructors	7	154
Teachers	6	88
African Farmers	3	66
African Women	2	44
Total	18	352

School Gardens.—In the Primary Schools of Nyanza Province the basis of agricultural training is the school garden where is demonstrated the local rotation, the proper use of land resting under grass, preparation of seed beds, manuring, time of planting, spacing and weeding of crops, the growing of vegetables, the making of compost and the value of hedges. The arrangement whereby European field officers and African Agricultural Instructors adopt a school for agricultural training and school garden work was continued with success. In the North Nyanza District there was keen competition for the Watson Shield which is awarded annually for the best school garden. A provincial ruling that candidates could not be entered for agriculture as an examination subject unless their school garden was first certified as satisfactory did much to improve the practical side of agricultural teaching. At intermediate and secondary schools the aim is to teach practical agriculture and stock husbandry on planned holdings adjoining the school buildings. Most progress was made in Kericho where 12 such holdings of about 10 acres each were offered and the development of some of them has begun. Land for school farms was also offered at two intermediate schools in Central Nyanza. All teachers undergoing training in Nyanza Province were taught as much agriculture as was possible under the existing syllabus. District Agricultural Officers conducted the practical examinations in agriculture at the teacher-training centres.

In the Central Province much of the routine visits to school gardens was disrupted by subversive activities at the end of the year. Particular attention was paid to schools in Fort Hall. Some school gardens have, however, actually been planned and a long-term programme of development laid down. In the Coast Province a simple layout, embracing the first elements of land husbandry, has been drawn up for all schools which will be put into effect in a more favourable season. Officers have visited all the main schools regularly and given talks to the pupils. In the Elgeyo District of Rift Valley Province interest has been stimulated by putting an instructor full time on to school gardens and by awarding prizes.

Young Farmers' Clubs and Better Farming Societies.—During the year a central organization was set up to foster Young Farmer's Clubs. In the European Highlands there are Young Farmers' Clubs in the Nakuru and Trans Nzoia Districts, the one at Nakuru progressing favourably but that in Trans Nzoia suffering from lack of young people. Perhaps more energy should be directed to the formation of associations which include both young and old. Five such Farmers' Associations have been formed in Uasin Gishu. Farmers' Days were held in all districts of the European Highlands aimed at demonstrating good practical farming methods.

In the Central Province all the Young Farmers' Clubs in Kikuyuland, except Kiamwangi in Nyeri, have gone into abeyance. Some can be resuscitated when times are more peaceful and this will give the opportunity of putting them on more practical lines. In Meru two clubs were formed of farmers whose work is a practical demonstration of the Department's teaching. The Better Farmers' Societies in Embu and Kiambu made disappointing progress. In South Nyanza a club was formed in East Nyokal which staged an impressive exhibit at the local agricultural show. A Better Farmers' Society was formed at Nyahera in Central Nyanza.

AGRICULTURAL SHOWS

Agricultural shows were cancelled in the Coast and Central Provinces because of the adverse season or the political temperature. In the Nyanza Province the policy of holding numerous small shows or village fairs was continued with success and at little cost, the showgrounds being prepared by the people in the locations concerned. Nine such shows were held in 1952, two in North Nyanza, three in Central Nyanza, three in South Nyanza and one in Kericho. Many thousands of Africans attended these shows which are of good educational value and many exhibited produce and stock.

The Royal Show of the Royal Agricultural Society of Kenya was held for the first time at Mitchell Park in Nairobi in June. The Department erected an attractive permanent stand and staged exhibits of African land use, African crops and produce and the work of the Egerton College of Agriculture. At the West of Kenya Show held in October at Eldoret in a stand kindly loaned by the Forest Department, great interest was shown by visiting farmers in the five departmental exhibits which covered the farm planning service, Kenya wheat production, crop and livestock production in Trans Nzoia and Uasin Gishu, developments in pasture research and departmental policy in the African Land Units of the Rift Valley Province.

Marketing

PRODUCE MARKETING AND INSPECTION

In Nyanza Province the heavy rains during the latter half of 1951 prevented the opening of most markets for the 1951/52 maize crop until January, 1952. Even then great care had to be exercised by the four Marketing Officers to prevent the buying of wet maize. Despite a high standard of inspection, weevil infestation and

loss of weight in store was heavier than usual. The short buying season and the bad condition of important roads created transport difficulties in North Nyanza. The dry season rendered the inspection and purchase of the 1952/53 maize crop easy while an appreciable proportion did not reach markets because local food shortages created large internal movements of maize, particularly from Kericho to the Luo on the Kano Plains and from Western North Nyanza to Uganda. While this assisted food shortages, its failure to pass through markets reduced the revenue collected by Maize Produce Control on behalf of Agricultural Betterment Funds. Storage capacity in the Province was further increased by the construction of three large stores at Kendu Bay and one at Mohoru Bay. The inspection and buying of the 1952-planted cotton crop proceeded under ideal weather conditions, "A" quality seed cotton comprising 94 per cent of the total purchases. Buying of wattle bark in Kericho District proceeded smoothly under the supervision of a European Inspector. There was much room for improvement in the preparation and marketing of the coffee crop of the Kisii Farmers' Co-operative Union.

In Central Province four Marketing Officers continued to be employed, maintaining normal produce inspection services and rendering assistance to Co-operative Societies. Good crops of maize, beans, cowpeas, *Dolichos*, potatoes, etc., harvested from the good 1951 short rains were marketed in 1952, the long rains produced little marketable surplus. While marketing of the wattle crop proceeded smoothly, some very poor quality bark was offered and the proportion of undergrade to F.A.Q. became excessive. Purchase of undergrade bark is being tightened up by only issuing permits to deliver 10 per cent undergrade of the amount of F.A.Q. sold. The Emergency necessitated special transport arrangements as much of the wattle bark comes from the areas affected by *Mau Mau*. Despite this the amount marketed was greater than in 1951.

In the Coast Province produce inspection was confined to cashewnuts, cotton, copra, wattle bark and, to a lesser extent, kapok and was undertaken by departmental Instructors, but it is hoped that Produce Inspectors will be provided in 1953. The Marketing Officer spent much of his time sorting out the marketing of wattle bark and vegetables in the Teita Hills.

CO-OPERATION

In Nyanza Province there were registered at the end of 1952, 52 primary co-operative societies, 32 of which were members of four co-operative unions. Of the unions, three in the Kimilili area of North Nyanza were engaged in the marketing of maize while that in Kisii was concerned with the preparation and marketing of coffee. Of the 20 independent societies, five in Central Nyanza were marketing rice, one was formed in North Nyanza for the marketing of coffee and the rest handled ghee, poultry and eggs. At the end of 1952 the co-operative societies had 4,739 members, share capital and reserve funds of £5,003 and total assets valued at £13,243.

In the Meru District of Central Province four new coffee co-operative societies were registered, bringing the total to seven with two more in formation. Besides his duties with the expanding coffee crop, the Senior Assistant Agricultural Officer had to give considerable supervision to the accountancy side of the primary societies and the training of the increasing number of clerks. While in Nyeri District a number of unsatisfactory co-operative societies were wound up, those which continued to function well on a sound financial basis included the Tetu Dairy Co-operative Union and the Nyeri Pig, the Matheru, South Tetu and Nyeri Coffee Growers, and the Tetu, Theienge and Othaya Pyrethrum Growers Societies. A Coffee Society was formed in Location 10 of Fort Hall. In Kiambu there are three Farmers' Societies, two Vegetable Societies selling to the Kenya Horticultural

Union, five pineapple societies and ten women's egg circles. While the Assistant Registrar, Co-operative Societies, was a great help, Emergency duties took up most of his time in the last quarter of the year. In the Coast Province vegetables, chillies and citrus were marketed through co-operative societies with varying degrees of efficiency.

GRADING AND INSPECTION SERVICES, MOMBASA

Inspection.—The number of packages of imported plant material and products inspected dropped to 182,249 compared with 253,813 in 1951 due to reduction in fruit imported from South Africa and Zanzibar. Phytopathological certificates for export totalled 200 while 258,071 bags of castor seed, as against 92,102 in 1951, were inspected. Much of the inspection had to be done at godowns, and with development of a buyer's market, penalty clauses were more severe; later, as shipping companies provided separate stowage for castor seed, it was possible to relax the inspection regulations.

Gradings.—Some concern was caused by maize from the Nairobi and Kisumu conditioning plants arriving in Mombasa re-infested with pests. This was traced to dirty railway wagons and tarpaulins. A large quantity of wheat rendered unmillable by the wet 1951 season was treated in the conditioning plant, inspected and exported without being graded and hence the big drop in wheat graded as compared with 1951. With the improvement in the bag condition, the requirement that potatoes be crated for export was relaxed. Most of the commercial beans submitted for grading were of the White Haricot type; almost half came from the Maize and Produce Control store in Nairobi; prolonged storage accounted largely for the deterioration in quality; 81 per cent being undergrade. The beans received from Tanganyika increased from 29,894 bags in 1951 to 49,658 bags in 1952, the quality also improved, undergrade dropping from 50.4 per cent to 38.5 per cent.

PRODUCE GRADES FOR EXPORT, 1952

	Maize	Wheat	Potatoes	Beans
	<i>Bags</i>	<i>Bags</i>	<i>Cwt.</i>	<i>Bags</i>
K.1	—	16,445	—	94
K.2	—	160	38,701	4,884
K.3	—	—	—	26,837
K.3 C	3,902	—	—	—
K.4	—	—	—	25,754
K.5	—	—	—	3,309
K.6	—	—	—	56,812
K.8 C.W.	756,170	—	—	—
K.8 C.Y	11,984	—	—	—
Musty	22	—	—	—
Weevily	10,726	—	—	—
Wet	2,245	—	—	—
Rejected	7,359	—	2	122
Re-bag	12,424	—	—	—
TOTAL	804,796	16,605	38,703	117,912

Although few exporters avail themselves of the export certificates or base their selling contracts on the grades laid down under the Grading of Chillies Rules, the introduction of this legislation has resulted in an improvement of the quality of *Capsicum minimum* and *Capsicum annum* exported and has given the exporting firms a basis on which to deal with up-country suppliers.

CHILLIES GRADED FOR EXPORT (BAGS), 1952

	Capsicum Minimum	Capsicum Annuum	Total
G.A.Q.	30	—	30
F.A.Q.	1,574	20,347	21,921
Undergrade ..	3,889	18,146	22,035
Rejected	—	200	200
TOTAL	5,493	38,693	44,186

Conditioning.—The conditioning plant treating grain for export ran continuously from August, 1951, to the end of July, 1952, treating 485,328 bags and exceeding the previous record output of 460, 098 bags in 1930. At the beginning of the year produce treated alternated between maize and wheat, 78,869 bags of weathered, unmillable wheat being conditioned. From July to the end of the year new crop, Tanganyika White Haricot beans came forward. While the fumigation of seed beans continued to decrease because of the use of insecticidal dusts, there has been an increased demand for treatment of commercial beans and other produce due to the non-availability of the conditioning plant.

PRODUCE CONDITIONED (BAGS), 1952

	Conditioned	Fumigated
Maize	297,446	—
Wheat	89,326	—
Beans	47,009	12,086
Grams and Pulses ..	4,342	—
Mtama and Millet ..	383	—
Miscellaneous Produce ..	—	8,225
Other Seeds	—	6
TOTAL	438,506	20,317

Finance.—The grading and conditioning services showed a profit to cover the almost non-revenue earning inspection service; a loss would have been shown had it not been for the revenue earned from the inspection of castor seed. Expenditure covering all services described totalled £19,748 as against £21,906 earned as revenue. The surplus may be attributed to the exceptional year and the comparatively large cereal exports.

PART IV—GENERAL

Library

Some 300 books were added to the Library during the year and the following periodicals were added to those already taken by the Department: "British Agricultural Bulletin", "Journal of the Science of Food and Agriculture", "Bibliography of Agriculture" (U.S.A.), "Proceedings of the American Society for Horticultural Science" and "Plant Pathology". Some 2,400 publications were circulated, in addition to those sent to out-stations for retention. As was the case last year, the public continued to make good use of the Library and many statistical inquiries from Consulates, commercial firms and other departments were dealt with. Four issues of the departmental newsletter, a roneoed publication, appeared during the year.

Publications

The following is a list of articles by departmental officers published during the year:—

Cereals—

Thorpe, H. C.—Varieties of Cereals for the Coming Season, 1952-53. *K.I.O. Fortnightly*, No. 225 (2997). Also published in *Kenya Weekly News*.

Coffee—

Melville, A. R.—A Note on Coffee and its Economics in Kenya. *Coffee Board Bulletin*, 17, 210.

Research Aids Kenya Coffee Industry. *East African Field Farm and Garden*, No. 167, p. 24.

Rayner, R. W.—Coffee Berry Disease: a Survey of Investigations Carried out up to 1950. *East African Agricultural Journal*, 17, 130.

Spraying in Time Can Prevent Leaf Rust. *Coffee Board Bulletin*, 17, 9.

Ecology—

Birch, W. R.—A Note on the "Whistling Thorn" in the Nairobi Area. *East African Agricultural Journal*, 18, 84.

Entomology—

Le Pelley, R. H.—Note on Damage to Grazing by Grasshoppers in Kenya. *Bulletin of Entomological Research*, 43, (1).

Le Pelley, R. H.—Variation in a Character in Some Species of *Pseudococcus* (Hemiptera: Coccidæ). *Proc. Roy. Ento. Soc., London. Ser. B*, v. 21, pt. 5-6.

General—

Webster, C. C.—The Organization of Agricultural Research in an African Colony. *Empire Cotton Growing Review*, 29, 157.

Horticulture—

Evans, H. R.—Pineapple Propagation. *East African Agricultural Journal*, 17, 179.

Plant Pathology—

Nattrass, R. M.—Preliminary Notice of the Occurrence in Kenya of a Rust (*Puccinia Polysora*) on Maize. *East African Agricultural Journal*, 18, 39.

Pyrethrum—

Beckley, V. A.—Pyrethrum Drying. "*Pyrethrum Post*", 3, 9.

Sisal—

Brook, T. R.—Soil and Water Conservation in Sisal. *East African Agricultural Journal*, 18, 79.

Agricultural Legislation

The only important legislative enactment during the year was the Wheat Industry Ordinance. All other legislation, both in the case of ordinances and rules and regulations, were in the main minor amendments made in the light of experience, additions to schedules and usual orders.

Wheat Industry Ordinance, 1952.—The primary purpose of this Ordinance is to make better provision for the economic marketing and distribution of wheat and flour grown and produced in the Colony. To achieve these objects the Ordinance prohibits the carrying on of the business of a miller except under licence and requires all mills to be licensed.

Section 3 of the Ordinance vests the marketing and distribution, and the allocation to East African territories, of wheat, flour and wheat-feed in the Member who, however, is required to exercise his control in accordance with the advice of the Wheat Board. Where allocation to East African territories is concerned, the Ordinance provides that the reasonable requirements of the Uganda Protectorate and Tanganyika Territory shall be met and for this purpose consultation with the Administrator of the High Commission is required. The control of the import and export of wheat, flour and wheat-feed is also vested in the Member.

Section 4 establishes the Wheat Board which will advise the Member on all matters relating to the exercise of his powers and the performance of his functions under the Ordinance.

Section 5 provides for the appointment by the Member of one or more agencies for the purpose of the Ordinance.

Section 6 deals with the licensing of millers. The section provides that no person, after the commencement of the Ordinance, shall carry on the business of a miller unless he is the holder of a miller's licence. The section further provides that every person who at the date of the commencement of the Ordinance is carrying on the business of a miller shall apply to the Member for a miller's licence. In the case of existing millers the Member shall grant such application provided he is satisfied that the mill or mills to which the application relates are licensed as mills under section 13 of the Ordinance. Section 8 contains provisions relating to a miller's licence.

Section 7 provides that a person wishing to carry on the business of a miller shall obtain a permit to acquire or build a mill.

Section 9 provides for the expansion of existing mills.

Section 10 prohibits a licensed miller acquiring any mill or commencing to construct any premises as a mill additional to those specified in his miller's licence without a permit.

Section 11 enables a licensed miller to obtain an increase in the quantity of wheat allocated by the Member when by reason of the expansion of his existing mills or the acquisition of new mills the capacity of his mills has been increased.

Section 12 provides for an appeal to the Supreme Court by any person aggrieved by the refusal of the Member to grant any licence or permission required under the Ordinance.

Section 13 contains provisions relating to a mill licence.

Sections 14, 15, 16, 17 and 18 contain provisions relating to the purchase and sale of wheat.

Section 20 empowers the Member on the advice of the Wheat Board to require the production of documents necessary to satisfy himself as to the quantity of wheat delivered at any mill or the amount of flour milled; the section will also empower the Member, after giving reasonable notice to the miller, to cause inspection of any mill to be carried out for the purpose of ascertaining whether the machinery of any mill corresponds with the specification set out in the mill licence.

Section 21 enables the Member to exempt wheat grown and consumed in any African area from the provisions of the Ordinance.

Section 22 enables the Member to make Rules under the Ordinance.

Section 23 provides penalties for offences against the Ordinance.

Coffee Marketing (Amendment) Ordinance, 1952.—The Coffee Marketing Ordinance was due to expire on 30th June, 1952. At the Annual Coffee Conference held in July, 1951, it was unanimously recommended that the organized marketing of coffee should continue and that certain amendments which experience over a period of more than five years had shown to be necessary should be made with a view to improving the control of the marketing of coffee and enabling the Board to set up a Committee on which there would be representatives of any body in any other territory whose coffee is being marketed by the Board jointly with coffee produced in the Colony. As the amendments to the law necessary to accomplish these objects were comparatively minor they were effected by means of a Schedule of amendments.

Pig Industry (Amendment) Ordinance, 1952.—This Ordinance amends the principal Ordinance in a number of respects which experience has shown to be desirable. Some of the amendments are designed to enable the Board to take more adequate steps to protect the industry from the possible effects, such as the spread of disease, of inefficient pig farming. Others provide for the management of the finances of the Board being subject, in future, to the approval of the Member for Agriculture and Natural Resources.

Other legislation enacted during the year was as follows:—

Rules and Regulations.—Crop Production and Livestock Ordinance: African Produce Improvement and Inspection (Amendment) Rules, Coast Province Marketing and Inspection (Amendment) Rules (Amendments to First Schedule), Hides and Skins (Revocation) Rules, Manure (Control of Export) Rules, Masai Hides and Skins Improvement (Revocation) Rules, the Native Lands Coffee (Amendment) and (Amendment No. 2) Rules, and the Wattle Bark (Improvement and Inspection) (Amendment) Rules. Control of Maize Regulations: usual price orders. Controlled Produce Regulations: Sunflower Seed added to Schedule: usual price orders. Increased Production of Crops Ordinance: usual orders. Land and Water Preservation Ordinance: Advances (Amendment) Regulations (Revised Schedule), General (Amendment) Rules, Land Conservation (Amendment) Rules. Native Lands Trust Ordinance: Athi-Tiva Land Utilization Rules, Kimulot Land Utilization Rules. Pig Industry Ordinance: Convening of Annual Conference of Delegates (Amendment) Rules, Paddocking of Pigs (Amendment) Rules. Plant Protection Ordinance: dates between which the planting of maize and sorghum is prohibited; flax and linseed added to Import Control Order, Pyrethrum Ordinance: Levy increased.

Staff

Except for the absence of the accountant on leave, the departmental headquarters' establishment operated at full strength throughout the year while the proportion of officers from the various services of the department who were absent on leave was exceptionally low. The strength of experienced and qualified Agricultural Officers was further depleted, as has been the post-war trend, by the loss of two Provincial Agricultural Officers, Mr. J. T. Moon on promotion to Uganda after 18 years, and Mr. J. E. P. Booth, O.B.E., on retirement after 20 years' service in Kenya, and of two Agricultural Officers, Mr. R. O. Williams on promotion to British Guiana, and Mr. H. T. Lloyd on retirement. Only two trained Agricultural Officers, Messrs. R. A. Sands and O. T. Roberts, were appointed during the year, so that at the end of the year there were vacancies for ten Agricultural Officers. There were no major changes of staff in the Soil Conservation Service. It remained difficult to fill vacancies for Assistant Agricultural Officers, of which there were 20 at the beginning of 1953, partly because all surplus

local manpower was engaged in Emergency duties and partly because suitable candidates from the United Kingdom were not forthcoming. So far as the Department was concerned, nearly 100 members were engaged full or part time on Emergency duties in the Kenya Regiment or Kenya Police Reserve.

In the Research Services, Dr. E. D. Bumpus was appointed Senior Pasture Research Officer, while other vacancies were filled by Mr. P. E. Wheatley, Entomologist; Mr. A. D. S. Duff, Plant Pathologist; Dr. L. A. Whelan, Soil Chemist; Mr. G. E. Dixon, Plant Breeder.

No Africans reading agriculture at Makerere were forthcoming to fill vacancies for Assistant Agricultural Officer (African) or Assistant Soil Conservation Officer (African), which were filled by outstanding agricultural instructors and levellers of long service. In fact, the numbers of Africans attaining to school certificate and Kenya African Secondary Schools Examination standards are so much below the demand that, much as it is desired to do so, none can be recruited to the ranks of Agricultural Instructor and we still have to be content with the Kenya African Preliminary Examination qualifications, one which does not give enough mathematics for the type of instructor required for farm planning for Africans. The five vacancies for Levellers in the Soil Conservation Service were filled with moderate Kenya African Secondary Schools Examination passes, but here again for farm planning for Europeans and for survey work, mathematics to the school certificate standard is really the minimum requirement.

I should like to place on record my sincere appreciation of the loyal support and co-operation received from all members of the staff. Especial thanks are due to those many officers, European and African in the Central and Rift Valley Provinces who played such a conspicuous part in the early stages of the fight against *Mau Mau*. By virtue of their intimate knowledge of the country and the people and by their devotion to duty and to Kenya they have earned praise on all sides. We salute the memory of those members of the staff, European and African, who have given their lives in the fight against lawlessness and bestiality.

G. M. RODDAN,
Director of Agriculture.

